ROUTINE RECONFIGURATION IN IT-ENABLED ORGANIZATIONAL TRANSFORMATION

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DECLARATION

I hereby declare that the thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

CHEN JING

15 October 2014

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Table of Contents

Summary

Routine reconfiguration is a necessary yet challenging step in any successful IT-enabled organizational transformation. However, due to the static view of the organizational routines, research on routine reconfiguration has been long overlooked. It is only in recent years that the dynamic view of the organizational routines has enabled researchers to investigate routine reconfiguration. The objectives of this thesis were to unravel the mechanisms underlying successful IT-enabled organizational transformation from the perspective of organizational routine. This study consists of two case studies, examining two types of routine reconfiguration in the context of IT-enabled organizational transformation, namely, (1) intra-routine reconfiguration, and (2) inter-routine reconfiguration.

Particularly, Study I is a case study on the intra-routine reconfiguration of a traditional company under e-commerce strategy implementation. It investigated the roles of routine reconfiguration and the corresponding mechanisms in the e-commerce strategy implementation of traditional companies. In particular, three roles of routine reconfiguration and their corresponding mechanisms are identified in traditional companies' e-commerce strategy implementation.

Study II seeks to gain more insights on the inter-routine reconfiguration, based on a case of a company conducting organizational transformation via ERP implementation. This study reveals that the reconfiguration of interconnected routines can be achieved via cross-fertilization of business domain knowledge. Three approaches of cross-

fertilization are further identified, with the configurations of cross-fertilization, the roles of pollinators, and the implications of routine reconfiguration described respectively.

The theoretical models from the two case studies, together with an integrative analysis based on the two cases, can help IS scholars understand routine reconfiguration in the focal context, and guide them in future exploration on this emerging research issue. The findings also contribute to the routine literature by investigating the dynamics among multiple routines. Practitioners may also find the theoretical models relevant. First, this thesis highlights the importance of routine reconfiguration in the process of IT-enabled organizational transformation. Second, it provides insights on how to manage routine reconfiguration in actual practices.

List of Tables

List of Figures

Chapter 1. Introduction

1.1 Background and Motivation

Organizational routines play important roles in organizations. Defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland 2003), organizational routines have been regarded as the primary means by which organizations accomplish much of what they do (Cyert and March 1963; March and Simon 1958 [1993]; Nelson and Winter 1982). Regarding its roles in organizations, first, organizational routines are major sources of organizational stability, which makes the organizational behavior more predictable, consistent, and efficient (Cyert and March 1963; Nelson and Winter 1982). Second, when being performed repeatedly, organizational routines are sources of organizational change, since the actual performance of routines may deviate from the behavior patterns defined by existing routines. Hence, routines make an organization more flexible and innovative (Feldman and Pentland 2003). Third, organizational routines capture the organizational regularities, especially the intangible organizational regularities that are deeply rooted in the organizational context and are hence very difficult for other organizations to imitate, such as an organization's core competence and capabilities. Hence, organizational routines are of core strategic value to an organization.

While organizational routines may benefit an organization in different ways, they may give rise to organizational inertia and rigidity when being performed in inappropriate situations (Gersick and Hackman 1990; Gilbert 2005; Hannan and Freeman 1984; Weiss and Ilgen 1985). For instance, in an organization without ERP systems, a salesman follows the routine to record

clients' information in his notebook. Yet if he continues to do so after the organization implementing ERP systems with CRM modules, the old routine becomes inertia for the organization. This presents harsh challenges for organizations in their transformation process, since inappropriate organizational routines could be too embedded to change, though they could fail to enhance the performance of organizations. Therefore, routine reconfiguration, which involves the retention, modification, deletion, and addition of actions that compose an organizational routine, is strategically critical, especially for organizations experiencing transformation.

Despite its importance, extant literature on routine reconfiguration is fairly limited. This is primarily due to the development of the conceptualization of organizational routines. Early conceptualization of organizational routines primarily considered routine as static or never-changing, thus inhibiting further investigation on routine reconfiguration (Becker 2004; Cyert and March 1963; March and Simon 1958 [1993]). In particular, the change of routine was included in the conceptualization of routine at the beginning of routine literature, for instance, Sidney Winter (1964, p. 263) defined a routine as 'pattern of behavior that is followed repeatedly, but is subject to change if conditions change'. However, in the later three decades, follow up definitions of routine mainly focus on routine as patterns (e.g., Nelson and Winter 1982; Teece and Pisano 1994; Teece *et al.* 1997), while the change aspect of routine disappeared in the literature (Becker 2004; Costello 2000).

It is only in recent years that the improved conceptualization of organizational routines has enabled researchers to investigate the dynamics of

routines in greater depth, leading to an emerging research interest on routine reconfiguration (Becker 2004; Feldman and Pentland 2003; Obstfeld 2012). Research on routine reconfiguration may help on understanding the nature of routine dynamics, as well as shed lights on how to better manage routines. The importance of studying routine reconfiguration is also evident by a recent call for papers on *Organization Science* in "*Routine Dynamics: Exploring Sources of Stability and Change in Organizations*" (D'Adderio *et al.* 2012).

The context of IT-enabled organizational transformation further amplifies the necessity of conducting and understanding routine reconfiguration.

First, the frequent and rapid advancements in information technologies (IT) require organizations to accordingly launch changes in tandem with the advancements. Cloud technologies, smart phones, location-based services, near field communication (NFC) technologies are among the emerging technologies that have been quite impactful, though they are recent IT innovations. For instance, it took only five years (2009–2013) for the percentage of global smartphone users to grow from less than 5% to over 30% (Meeker 2014). Such rapid advancements in IT present many new opportunities as well as challenges for almost any organization. A company will probably lose its competitiveness rapidly if it fails to adopt the latest technology trends. Yet adopting new technologies frequently and incorporating them into the operations of the company indicates that the company has to stay in a transformational stage most of the time, if not all the time. In such circumstances, routine reconfiguration, which is an essential success factor in an organization, becomes only increasingly important.

Furthermore, the advancements of IT may result in potentially drastic transformation to an organization. For instance, cloud technologies can significantly reduce organizations' IT investments, integrate various data sources, and alter how organizations capture, store, access and utilize data. Online social media, such as Facebook and Twitter, provides a substantial new approach to engaging and communicating with customers and presenting new advertising products. Failure to incorporate these technological opportunities is usually a huge shortcoming in competitive market. Therefore, conducting IT-enabled organizational transformation is key to an organization's future success, which makes routine reconfiguration in such a context strongly needed.

Extant literature indicates the difficulties organizations are facing towards routine reconfiguration in IT-enabled organizational transformation. For instance, in organizations implemented with an enterprise system, most IT users tend to utilize the new technologies at a minimum level and rarely initiate technology- or task-related extensions in their usage (Davenport 1998; Jasperson *et al.* 2005; Rigby *et al.* 2002; Ross and Weill 2002). In other words, although the organizations implement advanced technologies to transform their existing performance, it does not necessarily means their organizational routines being automatically reconfigured. This becomes a major cause of failure in achieving IT-enabled organizational transformation. Without successful routine reconfiguration, an organization fails to fully leverage the potential of information technologies.

Considering the theoretical and practical importance of investigating routine reconfiguration in the context of IT-enabled organizational

transformation, the main objectives of this thesis are to explore the roles of routine reconfiguration in IT-enabled organizational transformation, and to explore how routine reconfiguration can be successfully conducted in IT-enabled organizational transformation, in order to further understand the nature and dynamics of organizational routines and present fresh perspectives on the managerial approaches in IT-enabled organizational transformation.

1.2 Literature Review: Routine Reconfiguration

1.2.1 Organizational Routine and Its Roles in Organizations

Organizational routines (hereafter simply referred to as "routines") are defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland 2003, p. 96).

Organizational routines have been central in organizational studies for their important roles in an organization since Nelson and Winter's (1982) foundational work on routines. Table 1-1 lists some routines that have been investigated in prior literature. A central characteristic of routines is the notion of "patterns", which captures the regularity that the concept of routine stands for. Owing to this characteristic, routines constitute a form of "organizational memory" (Nelson and Winter 1982; Teece and Pisano 1994; Teece *et al.* 1997). Hence, they have been regarded as the primary means by which organizations accomplish much of what they do. Meanwhile, they are a major source of stability. Particularly, organizational routines enhance regularity, predictability, and efficiency (Cyert and March 1963; March and Simon 1958 [1993]) and aid coordination and conflict resolution (Nelson and Winter 1982; Simon 1947/1997; cf. Stene 1940).

Given these critical roles of routines in organizations, inevitably, routines have been widely used in organizational studies as a unit of analysis for observing and explaining organizational changes (e.g., Anand *et al.* 2012; Pan *et al.* 2007b).

Table 1-1 A Sample of Routines Investigated in Extant Routine Literature

Routines Examined	*References*
Hiring and training	(Feldman 2000; Feldman 2004; Feldman and Pentland 2003)
Invoice processing	(Pentland *et al.* 2010; Pentland *et al.* 2011)
Accountancy practice	(Døving and Gooderham 2008)
Product quality maintenance	(Anand *et al.* 2012)
Waste Collection	(Turner and Rindova 2012)
(1) Machine tool manufacturing (2) Computer workstation manufacturing	(Sorenson *et al.* 2006)
Price-setting/Price-adjustment	(Dutta *et al.* 2003; Zbaracki and Bergen 2010)
Surgical care for joint replacement patients	(Gittell 2002)

Routines, as a source of stability for an organization, do not always benefit an organization. When the performance of routines does not fit its circumstance, routines give rise to organizational inertia and rigidity, which inhibits an organization from being competitive and wreaks havoc on its efforts to transform, and consequently renders change very difficult (Edmondson *et al.* 2001; Gersick and Hackman 1990; Gilbert 2005; Hannan and Freeman 1984; Levitt and March 1988; Nelson and Winter 1982; Weiss and Ilgen 1985). Hence, routine reconfiguration is critical for an organization

to seize the significant value and mitigate the potential harm of entrenched organizational routines.

While researchers realized the need to understand routine reconfiguration quite early (Cohen and Bacdayan 1994), extant literature on routine reconfiguration remains limited. This is primarily due to the lack of theoretical conceptualization to open the black box of routine dynamics. Previous research tends to focus on the competence of routines rather than routine reconfiguration (Feldman and Pentland 2003; Obstfeld 2012).

1.2.2 Two Streams of Routine Research

The extant literature examines routine from two perspectives. Traditional literature on organizational routines adopts a static perspective, in which routines are considered to be static and to serve as a source of stability, reliability, and exploitation (Cyert and March 1963; March and Simon 1958 [1993]). Although researchers of this tradition acknowledged that routine is changeable, they are more interested in stability, and they have portrayed routines as unchanging black boxes or entities. Subsequent research supports this perspective by exploring the difficulty of changing routines and demonstrates that routines may be a source of organizational inertia and rigidity (Edmondson *et al.* 2001; Gersick and Hackman 1990; Gilbert 2005; Hannan and Freeman 1984; Levitt and March 1988; Nelson and Winter 1982; Weiss and Ilgen 1985). This perspective has been criticized for offering limited understanding of how routines operate in practice (Pentland and Feldman 2008).

It was more recently that Feldman and Pentland (2003) re-conceptualized organizational routines with a duality nature they termed "routine as duality", which equipped researchers on routine to explore the dynamics of organizational routines. In contrast to the traditional static perspective, this dynamic perspective considers routines to be stable but ever changing, because the ongoing performance of routines provides various deviations from the behavior patterns defined in existing routines, in accordance to the actual circumstances during performance. Thus, routines serve as a source of change, innovation, and exploration (Feldman 2000; Feldman and Pentland 2003; Pentland *et al.* 2011). Although early literature on routines postulated that routines were not purely static but modifiable, the dynamic perspective did not receive sufficient research attention until very recently (Obstfeld 2012). Hence, this is still an emerging research area that awaits further research efforts.

Feldman and Pentland's conceptualization of routines as having a "dual nature", and described as "routine as duality", serves as the theoretical foundation of the dynamic perspective (Feldman and Pentland 2003). Specifically, routines consist of two fundamentally distinct but interdependent aspects, namely, the ***ostensive aspect*** and the ***performative aspect***. The ostensive aspect of routines captures the general and abstract patterns in routines, such as standard operating procedures (SOPs), company documents, work instructions, and the International Organization for Standardization (ISO) series. In contrast, the performative aspect refers to the specific performance of specific people at specific times and places, with reference to how a routine, for instance, an SOP, is executed. In essence, the ostensive aspect captures a

"routine in principle", whereas the performative aspect captures a "routine in practice" (Feldman and Pentland 2003).

By adopting this conceptualization, the dynamic perspective of routines portrays the operation of routines as a flexible performance that depends on particular circumstances and emphasizes that changes to routines are inherent to the operation of routines; hence, the dynamic perspective provides the theoretical basis to investigate routine reconfiguration (Feldman 2000; Pentland and Rueter 1994). Moreover, this conceptualization implicitly suggests the possibility of intervening purposefully in the change of routine, thereby indicating the potential practical implications from research on routine reconfiguration. In particular, the ostensive aspects of routine can be manageable by purposefully changing its design. The performative aspects of routine may be adjusted accordingly towards what the ostensive aspects of routine have defined.

Corresponding to this theoretical advance, the main research interest on organizational routines has been gradually shifting from a ***capabilities approach***, which is about what routines do and how they lead to firm performance, to a ***practice approach***, which is about how routines operate and what their internal dynamics are (Parmigiani and Howard-Grenville 2011). This practice perspective highlights the importance of human actors and artifacts in the dynamics of routine, which significantly enriches the scope of routine literature. However, the research from this latter perspective remains emergent and proves to be far from fruitful (Parmigiani and Howard-Grenville 2011). Accordingly, this thesis on routine reconfiguration aims to contribute to the practice perspective.

1.2.3 Routine Reconfiguration

While the dynamic perspective of routine enables researchers to open the black box of routine changes, research on routine reconfiguration is still fairly limited. ***Routine reconfiguration*** involves the retention, modification, deletion, and addition of actions that compose an organizational routine. According to extant literature on routine reconfiguration, I identified two kinds of routine reconfiguration based on their research scope: ***intra-routine reconfiguration*** and ***inter-routine reconfiguration***. Research on ***intra-routine reconfiguration*** focuses on how a specific routine evolves through interaction with its environment (e.g., Anand *et al.* 2012; Feldman 2004; Goh *et al.* 2011; Pentland *et al.* 2011; Turner and Rindova 2012; Zollo and Winter 2002; Zott 2002), while research on ***inter-routine reconfiguration*** centers round how one routine is established or changed by another routine (e.g., Agarwal *et al.* 2012; Raman and Bharadwaj 2012).

Based on Thompson's (1967) typology on interdependence, I identify inter-routine reconfiguration by examining whether there are ***sequential or reciprocal impacts*** among the focal routines to be investigated. The ***sequential*** impact occurs when the change of one routine produces consequences that change another routine. This is commonly seen among routines that typically present sequential task interdependency. For instance, the reconfiguration of the product delivery routine may impose changes to the post-delivery service routine (e.g., changing the time schedule of delivery may lead to a change in service arrangement). In addition to the sequential impacts, ***reciprocal*** impacts refers to the potentiality for consequences of the focal routine's impact on another routine to become, in their turn, conditions that further affect the focal

routine, which then produces further consequences (Strauss 1993). For instance, the reconfiguration of the procurement routine and the reconfiguration of the finance routine are considered as inter-routine reconfigurations, since for such two highly intertwined routines, the change in finance routine may lead to a change in the procurement routine, thus, in turn, causing changes again in the finance routine (e.g., changing the criteria in evaluating finance-related actions may change the approach used in the procurement routine, and in turn leading to changes in the finance routine when dealing with procurement actions).

Owing to the dynamic nature of routine reconfiguration causing changes in existing routines, researchers adopt a dynamic perspective and usually focus on intra-routine reconfiguration. Regarding ***intra-routine reconfiguration***, prior empirical research suggests that routines are not only stable (Allatta and Singh 2011; Howard-Grenville 2005), but also ever changing (Anand *et al.* 2012). Such changes stem from the variations happened during the ongoing performance of routines, and may be both endogenous and exogenous (Pentland *et al.* 2011; Zott 2002). Furthermore, previous studies highlight the importance of co-evolution between routines and the external environment in routine evolution from several theoretical perspectives (Feldman 2004; Goh *et al.* 2011; Zollo and Winter 2002).

However, due to the relatively late development of the dynamic perspective of routines (Feldman and Pentland 2003), little is known about how to purposefully change existing routines. Moreover, while these studies treat organizational routines holistically as individual units of analysis in examining organizational changes (e.g., Anand *et al.* 2012), few studies have

examined routine reconfiguration by deconstructing organizational routines and investigating the relationships among the components of routines, which may enable a deeper understanding of the mechanisms underlying routine reconfiguration. Study I of this thesis aims at the aforementioned research gaps.

Furthermore, regarding ***inter-routine reconfiguration***, extant research is even more restricted (D'Adderio *et al.* 2012). The very few studies under this category have mainly focused on learning from one routine in order to transfer the approach used to another routine, which is inter-routine reconfiguration among independent organizational routines. The process of successful routine transfer and the effect of prior resource allocation in routine transfer are also discussed in the literature (Agarwal *et al.* 2012; Raman and Bharadwaj 2012). In such sense, research on the inter-routine reconfiguration, in other words, reconfiguration of interconnected routines is still underexplored. This is a critical theoretical gap that needs filling. Routines exist and perform not in a vacuum, but in an ecosystem containing multiple interconnected routines. Since these routines are interrelated with each other in their design as well as in performance, the effort of changing one routine causes potential impacts on its interconnected routines. The reconfiguration of interconnected routines therefore involves coordination. Moreover, if these routines fail to be well connected, they will affect the overall success of the company. Many organizations fail to perform well not just because of certain inappropriate routines, but also because of the lack of effective coordination among a set of interconnected routines (Carlile 2004; Kumar and Van Dissel 1996). Therefore, in response to this challenge, it is imperative to understand

how to reconfigure interconnected routines (D'Adderio *et al.* 2012). Study II attempts to contribute to this issue.

1.2.4 Routine as Trajectory

In this thesis, I adopted "routine as trajectory" (Strauss 1993) as my theoretical lens to analyze routine reconfiguration. "Routine as trajectory" essentially is defined as an organizational routine which can be viewed as a trajectory (Becker *et al.* 2006; Obstfeld 2012). In my thesis, a trajectory is defined as "a sequence of interdependent actions involving multiple actors" (Obstfeld 2012). The term "trajectory" captures the course of any particular phenomenon as it evolves over time, as well as the anticipated and unanticipated interactions between the phenomenon and the external environment affecting its evolution (Strauss 1993). With the conceptualization of "routine as trajectory", organizational routines can be viewed as trajectories of interdependent actions through which organizations accomplish much of what they do (Obstfeld 2012). Accordingly, in the context of routine reconfiguration, one can view routine reconfiguration as the process of changing existing trajectories toward desired ones.

In particular, the process of changing existing trajectories can be described as the dynamics among three trajectory elements, namely, trajectory projection, trajectory scheme, and trajectory action (Obstfeld 2012; Strauss 1993). Here, trajectory projection is defined as the vision of an expected or desired outcome and the associated course of interaction to achieve it; while trajectory scheme is defined as the plan designed to guide interactions consistent with the trajectory projection; and trajectory action refers to the

specific actions executed by specific people at specific times and places (Obstfeld 2012; Strauss 1993).

Adopting the conceptualization of "routine as trajectory" is particularly appropriate for studying routine reconfiguration mainly because the trajectory concept provides the flexibility necessary to observe actions on a continuum of repetitive to non-repetitive actions (Obstfeld 2012), which is necessary for studying routine reconfiguration. I will further discuss the roles of this theoretical lens in this thesis in Chapter 2.

1.2.5 A Choice between Routine Reconfiguration and Business Process Reengineering

In extant literature, both *routine reconfiguration* and *business process reengineering* (*BPR*) are related to the theme of this thesis, since both of them are essentially about the change of organizational behaviors. While they share a considerable overlap, I choose to study routine reconfiguration based on the need of my research focus. To elaborate my rationale and justify this choice, this section first introduces related definitions, followed by further comparison from four different perspectives.

1.2.5.1 Definition of Terms

Routine reconfiguration involves the retention, modification, deletion, and addition of actions that compose an organizational routine. And ***organizational routines*** are defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland 2003).

In contrast, ***business process reengineering*** is essentially about how to analyze and redesign the formal workflows and business processes within an organization, in order to fundamentally and radically improve organizational performance (Davenport and Short 1990; Hammer 1990). And the ***business process*** is defined as a set of logically-related tasks performed to achieve a defined business outcome (Davenport and Short 1990, p. 12).

Corresponding to the aforementioned definitions, let's take ***hiring routine***, a classic and commonly used organization routine in routine literature, as example to illustrate the scope of two conceptualizations (Cyert and March 1963; Feldman and Pentland 2003; March and Simon 1958 [1993]; Nelson and Winter 1982).

The ***business process of hiring*** generally involves the following 5 steps: (1) attracting applicants, (2) screening applicants, (3) selecting finalists, (4) preparing offer for finalists, and (5) completing the entry formalities.

As for the ***hiring routine***, it consists of both ostensive aspect and performative aspect. The ostensive aspect of hiring routine incorporates a set of action pattern when completing hiring task. It includes components to capture the overall design of this routine, such as standard operating procedures of hiring, which is similar to a codified business process, or taken-for-granted norm in completing hiring process, for instance, which is the actual primary channel to post the hiring advertisement, how to arrange daily working hours for screening applicants, etc. It also includes a significant amount of tacit knowledge regarding how to complete the hiring task, for

instance, how to prepare the most attractive job advertisement, how to negotiate with finalists on the offer details, etc. (Feldman and Pentland 2003).

Regarding the performative aspect of hiring routine, it is essentially the actual performance of the hiring routine situated in a particular context. For instance, when hiring for different types of positions, the staff have to make certain adjustments accordingly, including posting the job advertisement to different places, preparing search committees accordingly with different expertise, and applying different criteria to filter the job candidates.

The conceptualization of routine and business process share a considerable overlap, because organizational routines shall be largely aligned with business processes. When all or part of a business process can be achieved in a repetitive, recognizable pattern, routine can be identified accordingly. In such sense, business processes are not necessarily distinct from routines. Rather, business processes and routines merely originate from separate theoretical standpoints. In particular, business processes are primarily concerned with how activities are chained to effectively transform inputs into predetermined outputs, whereas routines are associated with executors' contextual interpretation of how these activities should be performed in practice.

Hence, the choice of routine as the research phenomenon is based on the characteristic of research. Since both studies in this thesis seek to decipher how business activities continuously evolve in response to the introduction of IT adoption/practices, in which the evolution is largely based on the executors'

contextual interpretation of how these activities should be performed in practice, routine reconfiguration would be more palatable to this research.

In addition to the aforementioned justification from the perspective of core conceptualization, I further justify my choice in the following four ways in subsequent sections:

1) The philosophical origins of the conceptualization of routine reconfiguration are a better fit for the organizational transformation investigated in this research.
2) The underlying assumptions of the conceptualization of routine reconfiguration are a better fit for the contemporary organizations investigated in this research.
3) The ontological nature of organizational routine makes the conceptualization of routine reconfiguration have a broader scope to capture richer organizational regularities in the organizational transformation.
4) The nature of routine reconfiguration better suits the organizational transformation investigated in this research.

1.2.5.2 Philosophical Origins

The concept of the *business process* centers on the productivity management from a process view. Such conceptualization initially has its origins in the well-known ***Taylorism theory*** (also called *scientific management*) (Davenport and Short 1990; Taylor 1914). This management theory is well-known for its revolutionary ideas on work organization, task decomposition and job measurement. Particularly, it stresses that in order to

increase organizational productivity, organizations should apply the same engineering principles that have proven to be successful in solving organizational tasks in the workplace. Accordingly, organizational tasks can be decomposed into a series of business processes with particular staff members assigned to take charge of each process, and the outcome should be measured to monitor and further improve organizational productivity. In order to improve productivity, organizations should do their best to refine the process.

Taylorism as a management theory had gradually become obsolete in the mid-20th century. However, the idea of the business process remains important in the domains of industrial engineering and management even today. A later management concept such as ***Total Quality Management (TQM)*** further serves as another original theory to enrich our understanding of the business process. In particular, while Taylorism is essentially about refining the process for higher productivity, TQM suggests the company to manage business operation with a process-oriented view. This process-oriented view serves as a company's key strategic tool and builds the company's core competence in operation. This thought becomes an important guideline in managing business processes, which led to the emergence of BPR in the1990s (Johansson *et al.* 1993).

In contrast, the concept of *organizational routines* originated from the ***evolutionary theory*** (Nelson and Winter 1982). This stream of thought focuses on explaining the changes in research subjects over time, and the explanation is basically based on a variation-selection-inheritance (knowledge transfer) cycle model (Nelson 1995). In particular, first, the research subject generates

multiple variations in its performance over a period of time. Next, a certain variation is selected based on some systematic factors, and eventually this variation will become the new version of the research subject as the selected version is inherited and performed in the future. Organizational routine, which is knowledge on how to behave appropriately in response to certain problems or tasks, is also considered as the outcome of evolution. In particular, routine is not formed within seconds, but gradually in the repetitive cycles of the generation of alternative solutions towards the problems, selection of the advantageous solutions, and the inheritance of selected solutions. Moreover, the evolutionary theory argues that, such an evolutionary cycle involves both random elements that generate variations in the research subject and systematical factors that continuously select the direction of evolution (Nelson 1995).

To sum up, the conceptualization of business process reengineering originated from the Taylorism theory and Total Quality Management, while the conceptualization of routine reconfiguration originated from the evolutionary theory. While the former focuses on the productivity management from a process view, the latter centers more on explaining the changes of certain research topic over time based on a variation-selection-inheritance cycle model. In this thesis on IT-enabled organizational transformation, a core research question is how an organization achieved such a drastic organizational transformation over time, which belongs to the evolutionary stream.

1.2.5.3 Underlying Assumptions of Organization

The difference of philosophical origins essentially leads to the differences in their assumptions on organizations. In particular, the conceptualization of the business process and business process reengineering is based on an assumption that organizations are mechanistic, while the conceptualization of organizational routine and routine reconfiguration has an underlying assumption that organizations are organic (Burns and Stalker 1961; Nelson 1995).

Both the concepts of Taylorism and TQM suggest a strong assumption that organizations are ***mechanistic organizations***, in which organizations are operationalized under very formalized and fixed procedures and practices (Burns and Stalker 1961). In particular, both of them highlight that organizational performance can be formally decomposed into clear and measureable business processes. Moreover, as long as these formal activities are well managed, the organization's performance will be successful. Research on business process reengineering also to a large extent follow this stream that highlights the importance of formalized practices. ***Business process reengineering*** is essentially about how to analyze and redesign the formal workflows and business processes within an organization, in order to fundamentally and radically improve organizational performance (Davenport and Short 1990; Hammer 1990).

Unlike business processes, the conceptualization of organizational routine implies an assumption that organizations are ***organic organizations*** which are operationalized very flexibly with numerous informal norms and practices (Burns and Stalker 1961). According to the evolutionary theory, both

random elements that generate variations and systematical factors that select variations can influence the evolution of organizational routines (Nelson 1995). Hence, organizational routine is not simply a formal blueprint or manual, which can be considered as purely a set of systematical factors. Instead, organizational routine incorporates rich information regarding the organizational contexts. As staff members have been in the organization for a considerable period and are familiar with their jobs, their routines would gradually emerge based on the contextual factors in their job performance, including the methods of cooperation, the methods of coordination, the methods of innovation, their cultures. Hence, their routines do not simply adhere to the formal business processes, but are deeply involved in how to deal with the informal norms and practices flexibly, which is consistent with the characteristics of organic organizations.

When examining the contemporary organizations under IT-enabled organizational transformation in this thesis, I aim to capture the rich dynamics in this process, such as the emergence of informal practices before new practices are formalized in organizational transformation. Therefore, routine reconfiguration is a better fit.

1.2.5.4 Ontological Nature

As mentioned previously, it is widely accepted that organizational routine has a duality nature (Feldman and Pentland 2003). In particular, routines consist of two fundamentally distinct but interdependent aspects, namely, the ostensive aspect and performative aspect. The ostensive aspect of routines is “routine in principle”, which involves general and abstract patterns. In contrast, the performative aspect is “routine in practice”, which refers to the

specific performance of specific people at specific times and places (Feldman and Pentland 2003). These two aspects of routines are fundamentally distinct because the ostensive aspect captures the regularity of organizational behavior at a cognitive level, while the performative aspect captures the regularity of organizational behavior at a behavioral level. At the same time, they are interdependent because the ostensive aspect guides the performance of routine, while the performative aspect shapes the design of routine.

In contrast, the scope of the concept of the business process in organizational behavior is of a smaller scope. Similar to the ostensive aspect of organizational routine, the business process merely captures the abstract patterns on how certain organizational tasks are performed. Yet the conceptualization of business process doesn't cover the performative aspect of organizational routine.

In addition, even when compared with the ostensive aspect of organizational routine, the scope of the business process with regard to the abstract patterns of organizational behavior is smaller. In particular, the business process is simply a set of logically-related tasks performed to achieve a defined business outcome, which is explicit and can be applied to any organization performing the same tasks towards the same targeted outcome. The ostensive aspect of organizational routine on its part, captures the tacit skills or knowledge of staff members without any formal blueprint or manual as guidance, in addition to the explicit rules and patterns on how to perform, which is very similar to the notion of the business process. These intangible elements are highly embedded in the unique organizational context of the focal organization. Meanwhile, they are path-dependent in nature (Becker

2004). Hence, every organization has a unique routine, even though it is designed to perform the same business process. Empirical studies show that, even when using the same technology for the same highly-institutionalized task (i.e., invoice processing), different organizations may develop individual fruitful organizational routines, while they are actually following almost the same business process (Pentland *et al.* 2010).

To sum up, organizational routines encompass richer components and details to explain how an organization performs regularly. Such an ontological nature of organizational routine makes the conceptualization of routine reconfiguration have a broader scope to capture richer organizational regularities in the organizational transformation. For instance, unacknowledged common practices and organizational cultures are not considered as part of the business process reengineering, yet they are equally important, if not more important, in the effect of organizational transformation.

1.2.5.5 Nature of the Changes in Routine Reconfiguration and in Business Process Reengineering

Last but not least, the nature of the changes in routine reconfiguration and in business process reengineering are different.

Business process reengineering (BPR) is essentially a ***decision-making process***. The business process, by definition, is a set of logically-related tasks performed to achieve a defined business outcome (Davenport and Short 1990, p. 12). This definition already implies that, the management level of an organization plays the key role in making decisions on the logically-related tasks to be performed, in order to achieve certain business outcomes. Similarly,

the BPR is also a management-level-driven organizational change. Back in the 1990s, BPR was at its height in the management literature as well as in management consulting, advocating that an organization should transform its traditional rigid management of different functions and divisions, into a business-process-oriented management style. Specifically, it suggested that the business process be redesigned to make it more smooth and cost-effective, and any extra resources that were not useful for the performance of the business process should be eliminated to save costs and increase productivity (Hammer 1990). For instance, organizations implementing BPR often experienced big reductions in human resources. Accordingly, it is obvious that the BPR is a decision process performed by the management level to redesign the business process.

In contrast, routine reconfiguration is an ***experiential learning process*** (Cohen and Bacdayan 1994). Organizational routine is deeply embedded in the organizational contexts. In its repetitive performance, organizational routine is shaped by every actor's feedback towards his/her experience, because actors learn new information gradually during the performance of routine.

To sum up, business process reengineering is a deliberate decision-making process, while routine reconfiguration is an experimental learning process. When examining the context of IT-enabled transformation, I can tell that the IT-enabled transformation in reality is far more complex than simply following some managers' instructions. Rather, the process of such transformation contains every actor's learning-by-doing efforts. Therefore, routine reconfiguration is a better fit.

1.3 Research Focus and Thesis Organization

This thesis broadly focuses on a central research question pertaining to: *How can routine reconfiguration in IT-enabled organizational transformation be conducted.* Based on my literature review, two types of routine reconfigurations are identified in extant literature, namely, intra-routine reconfiguration and inter-routine reconfiguration. Accordingly, two in-depth case studies were conducted to investigate both kinds of routine reconfigurations respectively. Table 1-2 summarizes the cases included in this thesis.

In particular, Study I focuses on the routine reconfiguration of single routines in a case of a traditional organization implementing e-commerce strategy, while Study II focuses on routine reconfiguration of interconnected routines in the context of Enterprise Systems (ES) post-implementation. Both case studies address current research gaps in extant literature, and they together shed light on how routine reconfiguration is achieved in IT-enabled organizational transformation. In addition to the single case analysis for the first two studies, an integrative analysis of the two cases is provided.

The opening chapter has provided an overview of this thesis, including the background and motivations, a summary of literature review, and the research focus. The subsequent chapters of this thesis are organized as follows.

Chapter 2 describes the methodology of this thesis, including the case study methodology adopted, case selection, and the roles of theoretical lens.

Chapter 3 provides the case description and findings of the studies in this thesis. It consists of three sub-sections, Study I, Study II and an integrative analysis of the two cases. In Study I, A case study of Haier is conducted to explore how to reconfigure a particular routine, in other words, how to conduct intra-routine reconfiguration. Discussions and implications are then presented. In Study II, a case study of Wanhua is introduced to explore the approaches for the reconfiguration of interconnected organizational routines in the context of its Enterprises Resource Planning (ERP) implementation, in other words, how to conduct inter-routine reconfiguration. Discussions and implications are then presented. Afterwards, an integrative analysis of the two cases based on the two studies is presented. The comparison of the two cases is with regard to the contexts of the IT-enabled organizational transformation, the mechanisms used in routine reconfiguration, and the findings generated, followed by a discussion.

Chapter 4 concludes the thesis by summarizing the findings, and highlighting the potential theoretical and practical contributions of the thesis.

Table 1-2 Summary of Study I and Study II

	Study I: Intra-Routine Reconfiguration	***Study II: Inter-Routine Reconfiguration***
Focus of Study	Role of routine reconfiguration and how an organization reconfigured single routines	How an organization reconfigured interconnected routines
Theoretical Lens	Routine as Trajectory (Obstfeld 2012; Strauss 1993)	
Key Finding	Routine reconfiguration of single routines can be achieved via the interactions among an organizational routine's trajectory projection, trajectory scheme, and trajectory action	Routine reconfiguration of interconnected routines can be achieved via the process of cross-fertilization of business domain knowledge
Organization	The largest home appliances company in China (Haier)	A world-leading chemical enterprise in China (Wanhua)
Primary Data	Onsite semi-structured interviews in Sep 2010 and Jan 2013 30-hour interview	Onsite semi-structured interviews in Nov 2013 15-hour interview
Secondary Data	Internal publications; Field notes; Online documents; Books; Magazines; China's Twitter-like Weibo	Internal publications; Field notes; Online documents

Chapter 2. Methodology

2.1 Case Study Methodology

The research for this thesis adopts the case research methodology. Case research is a form of qualitative research that emphasizes language, subjective interpretations, and the contextual setting of a phenomenon of interest (Maxwell 2012). The purpose of case research can be descriptive, exploratory or explanatory (Yin 2013). The research conducted in this thesis falls into the category of exploratory case research, which seeks the inductive derivation of theories (Eisenhardt and Graebner 2007). Exploratory case research is commonly used because it allows researchers to benefit from the inherent richness of case data (Miles and Huberman 1994).

Case research is particularly appropriate for this research as its strengths are well aligned with our research objectives. First, case research is particularly useful for examining processes (Gephart 2004; Orlikowski and Baroudi 1991), and this research seeks to understand the processes of routine reconfiguration in IT-enabled organizational transformation. Second, case research is well-suited for studying emerging phenomena and exploring new conceptual arguments (Siggelkow 2007), while routine reconfiguration exactly lies in an emerging research area of routine dynamics (D'Adderio *et al.* 2012; Parmigiani and Howard-Grenville 2011) and there is currently little research on how the routine reconfiguration is achieved in IT-enabled organizational transformation. Third, case research is particularly effective for studying complex phenomenon, in which adopting an objective research method is difficult (Klein and Myers 1999). Since routine reconfiguration is indeed a complex phenomenon that is embedded in the organizational context

(Feldman and Pentland 2003), case method is the most appropriate (Pentland 1999). Finally, case research is particularly appropriate for addressing "how" and "why" research questions (Siggelkow 2007; Walsham 1995), while my research questions are all "how" questions regarding the process of intra- and inter- routine reconfiguration is achieved.

The underlying philosophy of science that underpins my research approach is characterized as "soft positivism" or "scientific realism" (Kirsch 2004; Madill *et al.* 2000). This is a hybrid approach of both positivism and interpretivism. Particularly, this approach examines the preexisting phenomena and relationships among them, which is based on the assumption that the phenomena of interest are relatively stable and objectively exist. This assumption aligns with a positivist view. Meanwhile, this approach not only examines preidentified constructs as positivists do, but also explores other constructs in the manner of interpretivism approach. By doing so, this approach can potentially leverage the strengths of conventional positivist and interpretivist approaches, while mitigating their shortcomings. It allows researchers to conduct the data analysis with certain expectations based on prior theory, while also allowing some unexpected findings and explanations to emerge from the data, as is more typical of interpretivist approaches. In the following sections, I will further describe how this approach was carried out.

2.2 Case Selection

In this thesis, the Haier Group and the Wanhua Chemical Group were chosen as case organizations to investigate intra- and inter- routine reconfiguration respectively. While the two types of routine reconfiguration identified may exist within an organization simultaneously, the selection of

case organization emerged from the analysis on whether the case organization provides typical example and rich insights on intra-/inter-routine reconfiguration.

The Haier Group is selected as a suitable case organization for studying intra-routine reconfiguration based on the following two criteria: (1) the case organization is a traditional company that launched its e-commerce activities without prior experience and faced considerable organizational inertia and a lack of flexibility and innovation, and (2) the case organization successfully implemented intra-routine reconfiguration to deconstruct its organizational inertia and revitalize its flexibility and innovation. Haier's expansion from traditional to online retail channels meets these criteria. Moreover, Haier is one of the few traditional companies that have successfully cultivated its online business in China. Hence, I believe that this case study provides an opportunity to investigate the roles of routine reconfiguration in Haier.

The Wanhua Chemical Group Co., Ltd. is selected as a suitable case organization for studying inter-routine reconfiguration based on the following two criteria: (1) the case organization has experienced or has been experiencing reconfiguration of interconnected routines profoundly in scope and depth; (2) during its process of routine reconfiguration, in-depth IT was involved, and representing a typical situation in modern organizations. Accordingly, Wanhua Chemical Group is considered as a suitable case organization. First, the company did experience a large scale routine reconfiguration, involving most of its important routines. As these routines are often intertwined with each other, and there are often sequential or reciprocal

impacts among these routines, the company is suitable for investigating interconnected routines. Second, the company's enterprise systems (ESs) were inseparable from its experience of routine reconfiguration. Hence, I believe that this case organization suits my purpose of research.

2.3 Roles of Theoretical Lens

As mentioned in Section 1.2.4, the extant literature suggests that an organizational routine can be viewed as a trajectory, conceptualizing "routine as trajectory" (Becker *et al.* 2006; Obstfeld 2012). Specifically, with this conceptualization, organizational routines can be viewed as trajectories of interdependent actions through which organizations accomplish much of what they do (Obstfeld 2012). Hence, such reconfiguration can be viewed as the process of changing existing trajectories toward desired ones.

Adopting the conceptualization of "routine as trajectory" is particularly appropriate for studying routine reconfiguration. This conceptualization can be found in studies as early as 1926 (Becker *et al.* 2006) and has been adopted in existing routine literature (e.g., Obstfeld 2012). More importantly, the trajectory concept provides the flexibility necessary to observe actions on a continuum of "repetitive to non-repetitive actions" (Obstfeld 2012) in routine reconfiguration. Since routine reconfiguration involves a significant level of changes towards organizational routines, routine under reconfiguration will gradually become unstable, dissolved, replaced by emerging patterns, and then become stable again. Routines in this process must be performed using actions that range from very stable to dramatically emergent actions. Correspondingly, the trajectory concept serves as a suitable unit of analysis for studying routine reconfiguration because this concept accommodates both established routines

and routines under reconfiguration; in other words, the trajectory concept captures routines ranging from "quite routine to highly problematic" (Strauss *et al.* 1985).

Applying the conceptualization of "routine as trajectory" in this study also enables me to utilize related subconcepts to elucidate the dynamics of routine reconfiguration. Strauss (1993) provides a series of trajectory-related subconcepts, some of which are adopted in follow-up research (Obstfeld 2012). Based on the existing literature, I assert that the ostensive trajectory, which corresponds to the ostensive aspect of routine, encompasses the trajectory projection and trajectory scheme, where the trajectory projection is defined as the vision of an expected or desired outcome and the associated course of interaction to achieve it, and the trajectory scheme is defined as the plan designed to guide interactions consistent with the trajectory projection (2012; 1993).

The trajectory projection identifies the outcome of a trajectory and initiates or directs new or ongoing interdependent actions. For example, with a recruitment routine, the trajectory projection includes a desired outcome, namely, hiring qualified individuals, and a course of interdependent actions to achieve the goal, starting from establishing the selection criteria and advertising the hiring announcement to finalizing contracts with the selected candidates. While the trajectory projection provides a general blueprint for the trajectory, the trajectory scheme involves the extensive planning required to execute this blueprint. In my recruit example, the trajectory scheme is the particular arrangement of interdependent actions. For instance, in advertising the hiring announcement, after confirmation of the recruitment criteria, the

trajectory scheme outlines the person posting the information, the information dissemination channels, the date of posting, as well as the actions which follow.

In contrast to the ostensive trajectory, I argue that the performative trajectory, which corresponds to the performative aspect of routine, consists of the trajectory action, which are the specific actions executed by specific people at specific times and places (e.g., what actually happened during the recruitment process).

Since the trajectory action seems to be very similar to trajectory scheme in their illustrative examples, it is worthwhile to highlight that the key difference between trajectory scheme and trajectory action is the ***context-dependency***. Particularly, trajectory scheme is context-independent, while trajectory action is context-dependent. For instance, in a hiring routine, the trajectory scheme outlines staff A shall post the job advertisement via newspaper, magazine and email. And the trajectory action captures how trajectory action is conducted in a particular scenario. As such, trajectory actions demonstrate variations in actual performance, such as different time, selection and sequences of posting the job advertisement via different channels.

The aforementioned subconcepts are summarized in Table 2-1.

The three aforementioned concepts, i.e., trajectory projection, trajectory scheme, and trajectory action, can be used to analyze the dynamics during routine reconfiguration and reveal the interactions among these components of a trajectory.

Table 2-1 Summary of Components of a Trajectory

Constructs	***Definition***	***Illustrative Examples (in a recruitment routine)***
Trajectory Projection	Vision of an expected or desired outcome and the associated course of interaction to achieve it.	Hiring qualified individuals, following a course of interdependent actions starting from establishing the selection criteria and advertising the hiring announcement to finalizing contracts with the selected candidates.
Trajectory Scheme	The plan designed to guide interactions consistent with the trajectory projection.	In advertising the hiring announcement, after confirming the recruitment criteria, the trajectory scheme outlines who should post the information via what information dissemination channels by when, as well as which actions should follow.
Trajectory Action	The specific actions executed by specific people at specific times and places.	What actually happened during the recruitment process, it varies from time to time.

Chapter 3. Case Description and Findings

3.1 Study I: Routine Reconfiguration in Traditional Companies' E-Commerce Strategy Implementation: A Trajectory Perspective1

3.1.1 Introduction

An increasing number of traditional companies are deciding to enter the Internet market, owing not only to increased profit margins, high business volumes, and marketing effects associated with e-commerce, but also to competitive pressure from the burgeoning e-market. E-commerce companies can retain hefty margins for themselves while undercutting traditional competitors in terms of price by eliminating markups and creating more efficient cost structures. For example, many online-only apparel shops, such as Frank and Oak (frankandoak.com), dispense with levels of distributors and retailers between the manufacturer and customers, and sell directly to customers, achieving substantial savings in terms of production and distribution channel costs (Colao 2012). As e-commerce companies continue to expand and redefine the way that companies interact with customers, suppliers, and other business partners (Barua *et al.* 2004), they are invading business territories that were originally occupied by traditional companies, blurring boundaries between industries and organizations (El Sawy *et al.* 1999). Consequently, traditional companies must extend their offline business to the e-commerce domain to remain competitive in the long run.

Traditional companies aiming to enter the online market have to devise and implement e-commerce strategies because such e-strategies are crucial for

[1] Note: Part of this study is recently accepted by *Information & Management* in Dec 2013.

success in an e-commerce environment, by providing an overarching plan for e-commerce, increasing organizational effectiveness, and clarifying the direction of organizational activities (Chang *et al.* 2003). The extant literature on e-commerce strategy is extensive (e.g., Barua *et al.* 2004; Benjamin and Levinson 1993; Chatterjee *et al.* 2002; El Sawy *et al.* 1999; Grandon and Pearson 2004; Hackbarth and Kettinger 2004; Hoffman and Novak 2000; McAfee and Brynjolfsson 2008; Porter 2001; Urban *et al.* 2000; Venkatesan and Kumar 2004; Venkatraman 1994; Zhu and Kraemer 2002) but thus far has mainly focused on devising e-commerce strategies rather than implementing such strategies (Ngai and Wat 2002). However, e-commerce strategy implementation is of equal importance, as many traditional companies have been seen to fail in e-commerce strategy implementation. For instance, in China, leading traditional companies have been using e-commerce for several years, but very few have actually succeeded in this respect. In Europe, although more than 50% of traditional European retailers incorporated online stores in 2009, over 60% of these online stores have yet to leverage the potential benefits of e-commerce, as their e-commerce practices differ only slightly from those of their offline stores (Wauters 2009). These examples demonstrate the profound and pervasive struggles involved in e-commerce strategy implementation.

Often, organizations fail to successfully implement e-commerce operations because they fail to reconfigure their existing routines. Routine reconfiguration is necessary because the existing routines of traditional companies are less relevant to e-commerce and may even be in conflict with routines required for effective e-commerce strategy implementation. For

example, delivering orders in traditional retailing merely involves shipping bulk orders to a relatively small number of business partners' warehouses, while that for e-commerce involves shipping a substantial number of individual orders to numerous target destinations, thus requiring a different distribution arrangement. However, routines may be difficult to reconfigure because, on the one hand, owing to the persistent and inflexible nature of routines, existing routines pose severe organizational inertia that hinders e-commerce strategy implementation in traditional companies (Gilbert 2005), and, on the other hand, traditional organizations usually lack sufficient flexibility and innovation to better adapt to the new business environment because of their limited knowledge, experience, and lack of resources related to e-commerce (Lavie 2006).

Although routine reconfiguration is required for traditional companies to enter the Internet marketplace, knowledge of routine reconfiguration in this context is limited. Most research on e-commerce focuses on developing e-commerce (e.g., Barua *et al.* 2004; Hackbarth and Kettinger 2004) rather than implementing e-commerce strategies (Ngai and Wat 2002), and findings from the few studies on this issue (Benjamin and Levinson 1993; Grandon and Pearson 2004) are too general to guide routine reconfiguration in traditional companies. Thus, I consult the literature on routines to understand this issue. While a theoretical conceptualization of routines is provided to study routine changes (Feldman and Pentland 2003), and several follow-up studies have been conducted in this emerging area, little is known about how to purposefully change existing routines. Moreover, the extant literature usually treats routines as a holistic unit of analysis to observe organizational changes

(e.g., Anand *et al.* 2012) but does not examine the internal interactions among the components of routines, which may provide important insights for routine reconfiguration.

To fill these research gaps and acquire knowledge on how to reconfigure routines, this study investigates the roles of routine reconfiguration in the e-commerce strategy implementation of traditional companies and how routine reconfiguration can fulfill these roles by examining the interactions among the components of routines. The findings may assist organizations in selecting the most crucial roles of routine reconfiguration in their organizations and in focusing efforts to conduct routine reconfiguration in performing such roles to facilitate e-commerce strategy implementation. In particular, I draw on the conceptualization of "routine as trajectory" (Strauss 1993), in which routines are viewed as trajectories of interdependent actions through which organizations accomplish much of what they do (Becker *et al.* 2006; Obstfeld 2012). Adopting this conceptualization of routines enables me to view an organizational routine as a set of components of a trajectory and to investigate the relationships among these components. In addition, as studying routine reconfiguration requires observing routines at different levels of stability during their evolution, adopting this conceptualization of routines provides a suitable theoretical lens for this study because it enables me to observe and compare a range of actions affecting stability and change as well as both more routine and less routine forms of innovation (e.g., Obstfeld 2012).

Using a case study on Haier, one of the largest home appliance manufacturers in China and an organization that is in the process of

transforming from a traditional company to an e-enabled company, this research aims to understand routine reconfiguration in the context of e-commerce strategy implementation in traditional companies. Specifically, I use the conceptualization of "routines as trajectory", to investigate the roles of routine reconfiguration in Haier's transformation, as well as how routine reconfiguration is attained. This study thus aims to fill the research gap with regard to routine reconfiguration and to understand how to reconfigure routines in organizations. Accordingly, the research question for this study is:

In the context of e-commerce strategy implementation in traditional companies, how are the roles of routine reconfiguration attained?

3.1.2 Literature Review of E-Commerce Strategies

An e-commerce strategy is the direction and scope of an organization in adopting e-commerce for conducting business over the long term to gain competitive advantage in a changing environment through its configuration of resources and competences to meet stakeholders' expectations (Johnson *et al.* 2008). E-commerce strategy is vital for companies because it provides a framework for operational planning, increases organizational effectiveness, and clarifies the direction of organizational activities, thereby helping organizations to reap long-term benefits in the e-commerce marketplace, which is a business domain of critical strategic value (Chang *et al.* 2003).

The extant literature suggests that when organizations are devising a proper reorganization strategy, they should consider their internal environment (e.g., Chatterjee *et al.* 2002; McAfee and Brynjolfsson 2008), which includes the distribution of decision-making power (McAfee and Brynjolfsson 2008),

support and strategic investment rationale from management, and internal coordination capability (Chatterjee *et al.* 2002). Meanwhile, they should consider their external environment, which includes the consideration of the market players, the organization's market position in the value chain (El Sawy *et al.* 1999; Porter 2001), and customer engagement approaches (Hoffman and Novak 2000; Urban *et al.* 2000; Venkatesan and Kumar 2004). In considering the business environment and their product characteristics (Lee and Whang 2001), an organization may develop concepts, practice principles, and corresponding strategies for its various e-commerce operations (e.g., Chatterjee *et al.* 2002; El Sawy *et al.* 1999; Hoffman and Novak 2000; Lee and Whang 2001; McAfee and Brynjolfsson 2008; Urban *et al.* 2000) as the primary content of its e-commerce strategy. In addition, organizations should further develop roadmaps of the e-commerce development in phases (Hackbarth and Kettinger 2004; Venkatraman 1994) and employ various approaches to evaluate the e-commerce strategy implementation (Barua *et al.* 2004; Zhu and Kraemer 2002).

Compared with e-commerce strategy development, e-commerce strategy implementation is relatively overlooked in the literature (Ngai and Wat 2002). The few studies on e-commerce implementation provide frameworks for managing organizational changes during this process (Benjamin and Levinson 1993; Grandon and Pearson 2004). While these studies suggest that the adaptive changes of an organization's technology usage, business process, and organizational structure are necessary for successful e-commerce strategy implementation (Benjamin and Levinson 1993; Grandon and Pearson 2004), how these desired outcomes are put into

practice during e-commerce strategy implementation is seldom discussed. The lack of knowledge on e-commerce strategy implementation will inevitably constrain organizations' ability to fully appropriate value from e-commerce initiatives because organizational transformation is often hindered by organizational inertia and insufficient organizational capabilities (Gilbert 2005). Thus, organizations, especially traditional companies, whose existing practices are often irrelevant for e-commerce, must acquire knowledge to overcome such obstacles.

I address this research gap from the perspective of routines, because organizational routines serve as a major source of organizational inertia (Gilbert 2005) and concretize organizational capabilities (Feldman and Pentland 2003). Hence, to overcome the difficulties due to organizational inertia and insufficient organizational capabilities, routine reconfiguration is important for successful e-commerce strategy implementation (Johnson 1988). Next, I review the literature on organizational routines and routine reconfiguration.

3.1.3 Methodology

As mentioned in Chapter 2, this study adopts case research methodology with the Haier Group as case organization. Regarding the data collection and analysis, the theory-building process prescribed by Eisenhardt (1989) was followed in designing and conducting this study. Access to the case site was negotiated and obtained in September 2010. Prior to the onsite data collection, I spent two months scanning archival materials, including preliminary offsite emails and secondary data, to identify and conceptualize the phenomenon (Pan and Tan 2011). As the case organization is established,

fruitful archival data was collected from various sources, including its official corporate website, and from published books, news reports, magazines, and social media. My contextual understanding of the organization was also enriched by an expert who had been conducting research with the case organization for almost 10 years. Meanwhile, I researched top management and IS journals for concepts to form my theoretical lens (Walsham 2006). In this study, routine reconfiguration was identified as the "anchor point" for my theoretical lens. By analyzing the archival data and literature, a set of pertinent theories, constructs, and arguments as a "sensitizing device" (Klein and Myers 1999; Pan and Tan 2011) was derived to guide the subsequent data collection and analysis (Eisenhardt and Graebner 2007).

Onsite data collection was performed at Haier's headquarters in Qingdao in September 2010 and January 2013. The first visit occurred before Haier's transformation, and the second visit occurred after the transformation to better observe the progress of this transformation. In total, 21 semi-structured group interviews were conducted with an average of three informants per group. The group interview allows interviewer to facilitate a comprehensive exchange of views among interviewees, providing the advantage that ideas may be generated which would not have occurred to any one individual. The informants included the senior management, middle management, and their subordinates, and included the senior vice president, CIO, and department directors, in the hope to gain a comprehensive understanding on the case organization's operation and transformation from the perspectives of different business functions and different hierarchical levels. The total interview duration is about 30 hours. I noted how each

department operated before and after the transformation, what happened during the transformation, and how the management team was involved in the transformation. The group interviews, which lasted an average of 60–90 minutes, were digitally recorded and transcribed to create an equivalent single document of more than 200 pages (11pt font and single-line spacing) for subsequent data analysis. Although the interviews formed the primary data source, they were corroborated by secondary data sources, such as annual reports, internal publications, organizational documents, and field notes. The use of multiple data sources allows for triangulation that offers stronger substantiation of constructs and hypotheses (Eisenhardt 1989).

Data analysis was performed concurrently with the data collection to maximize the benefits resulting from the flexibility offered by the case study method (Eisenhardt 1989; Pan and Tan 2011). The “open coding” and “selective coding” techniques were adopted during this process. First, along with the data collection, we organized the case through “open coding” (Strauss and Corbin 1998), in which the data were broken down into conceptual categories (Walsham 2006). The pieces of categorized data were then examined, compared for similarities and differences, and organized into the themes.

Next, we started the “selective coding” (Strauss and Corbin 1998), which is a process for researchers to develop a theoretical model based on prior literature as a theoretical scaffold. A combination of narrative and visual mapping strategies was adopted to manage the large amount of data collected (Langley 1999). The narrative strategy is essentially about summarizing the primary and secondary data collected in the form of a story, while the visual

mapping strategies may help the researchers visualize the order of events, and better clarify the sequential and causal relationships among the events and consequences. The research focus of routine reconfiguration sensitized me to information related to the evolution of major organizational routines involved in the transformation, i.e., the order of the distribution routine and service routine. Narratives about the organizational routines at different stages along the reconfiguration process, the organizational context and decision-making process related to each change of these routines, and the effect of the routine reconfiguration were summarized in tables and diagrams, providing the basis to extract the theoretical concepts. I highlighted the descriptions of the expectations, arrangements, and actual operational performances for each routine at different stages. Subsequently, how the staff devised and revised the expectations and arrangements for routines and how they identified opportunities and challenges from the performance of routines during the reconfiguration process were summarized. From the descriptions, I identified tentative concepts that explained situations to implement routine reconfiguration and its corresponding effects, thus constructing my initial theoretical model. I further validated and revised the initial theoretical model, following an iterative process of moving back and forth among empirical data, relevant literature, and the emerging model, to ensure alignment among them. I spent another two months on this process until “theoretical saturation” was reached (Glaser and Strauss 1967; Pan and Tan 2011). During this process, I also had intensive discussions with two experienced case researchers to ensure the maturity of theoretical depth.

3.1.4 Case Description

3.1.4.1 Organizational Background

Haier Group is a multinational consumer electronics and home appliances company headquartered in Qingdao, Shandong, PRC. Founded in 1984, Haier has evolved from a poorly managed, small refrigerator manufacturer on the verge of bankruptcy to a global behemoth whose annual revenue exceeded USD $23.3B in 2012. Currently, Haier is the top-ranked white goods home appliance manufacturer in both global and domestic markets, selling a wide range of products in over 100 countries.

Despite its substantial past success in physical retailing, Haier did not devote much effort to e-commerce in China until it recognized the increasingly growing e-commerce trend and the importance of the online market for its future success. In 2010, Haier decided to venture into e-commerce vigorously. One strategic vision and two key strategic targets constituted its e-commerce strategy. The strategic vision was to transform from a traditional manufacturer to a contemporary service-oriented company in the Internet era. The first of the two strategic targets was channel service integration and expansion, which consisted of two sub-tasks: (1) achieving full-scale channel service capability that integrated distribution, logistics, after-sales service, and other complementary channel services and (2) transforming the channel service function from an internal functional supporter into a competitive commercial channel service provider. The other strategic target was online channel expansion, which also consisted of two sub-tasks: (1) achieving a competitive online market share and (2) transforming from a mass-product provider to a customized-product provider.

A critical obstacle to this strategic transformation was Haier's existing organizational routines, and thus, an extremely difficult, wide-ranging routine reconfiguration was required to achieve this strategic transformation. On the one hand, enormous organizational inertia was encountered in this process, which hindered routine reconfiguration. For instance, when Haier first engaged in e-commerce, the Logistics Department could not fulfill the orders on time because the existing logistic routines were still tailored for business partners rather than for individual online customers. On the other hand, a lack of flexibility and innovation hindered routine reconfiguration, which requires sufficient flexibility to utilize current resources, practices, and capabilities as well as sufficient innovation to develop new resources, practices, and capabilities. Such flexibility and innovation were not available before the transformation began (for instance, the company did not know how to respond to special requests from online customers) but were yet vital to the organization's success during the dramatic organizational transformation.

Despite these challenges, Haier's endeavors in the e-enabled business transformation attained initial success. Within five years, Haier not only became a major logistic service provider in China but also achieved significant growth in online transaction volume and online channel coverage. These achievements are largely attributed to the success of routine reconfiguration in the channel service business, which brought smooth operation and a series of leading industrial practices to their customers (such as delivery within 24 hours, door-to-door delivery for rural customers) to the company. This is because changing the highly established and stable routines in a channel service business is extremely challenging during a transformation process.

Moreover, such routine reconfiguration was fundamental to the success of Haier's e-commerce strategy implementation, because successful online channel expansion depends on high-quality channel service. Hence, Haier's successful reconfiguration process deserves an in-depth investigation to further understand routine reconfiguration.

Therefore, *Haier's organizational routines for order fulfillment in its channel service business, which was among the operational routines that was substantially reconfigured, form the context of this research.* Here, the routines for order fulfillment cover the routines involved from order receipt to order completion. In particular, two main routines in order fulfillment, namely, the ***order distribution routine*** and the ***service routine***, were identified. The performances of both routines are relatively independent of each other, so the reconfiguration of both routines can be considered as intra-routine reconfiguration. To answer my research question, this study examines the reconfiguration of these two routines. I present my data according to the sequence of performing the two routines in the subsections that follow. To provide a comprehensive description on the evolution of the two routines, I will articulate the vision, planned arrangement, and actual performance of each routine at different stages of the Haier's transformation. Such approach is chosen for preparing further data analysis and theorization based on the lens of "routine as trajectory", since the case data presented represents trajectory projection, trajectory scheme, and trajectory action, respectively. In addition to the case description below, detailed quotations are provided in Appendix A for readers' further references.

3.1.4.2 Reconfiguration of the Order Distribution Routine

An order distribution routine aims at delivering the right products to the right destination in a timely manner. A core order distribution routine involves an order request from a client, a transportation schedule for the order, order dispatch and delivery, and the collection of proof of the delivery.

Order Distribution Routine: Before Reconfiguration

Prior to Haier's e-commerce strategy implementation, the company only accepted B2B orders from distribution channel partners, such as authorized retailing stores and department stores. Therefore, the order distribution routine was generally used to transport large volumes of products from the factory to the client's warehouse to attain client satisfaction by successfully and timely delivery of bulk orders. Established and stabilized in over 20 years of B2B practices, this order distribution routine was highly mature.

I follow with a representative order distribution routine prior to the transformation. The order distribution routine is triggered when channel partners place a new order. The Logistics Department then begin coordination with the Production Department to generate a production plan that includes a specific product collection time to balance the daily logistic resources required for product transportation. Based on the production plan, the Logistics Department schedules the order transportation plan, including pick-up time, routes, and vehicles. The transportation plan will be continually revised until a production plan is confirmed. Once the products are manufactured, the Logistics Department transports products from the factory to the transportation

center (TC) for further distribution. At the TC, the logistics staff pick up the products listed on the order after confirming payment with the Finance Department. Next, the logistics staff dispatch and deliver the products as planned. When the order arrives at the client's warehouse, the delivery staff will collect the client's signature as an acknowledgment of product receipt. The Logistics Department settles the service charge according to the order distribution performance, and the Finance Department mails the order invoice separately. Overall, the order distribution routine spans three communities: the Logistics Department, the Production Department, and the Finance Department.

Changes to the Order Distribution Routine

As Haier began its transformation, an ***initial routine refinement*** was implemented to form a complete order distribution routine that proceeded from the receipt of an online order to order delivery. In addition to receiving orders from online rather than offline customers, the Logistics Department requested feedback from the TC regarding the stocking status of ordered products rather than collaborating with the Production Department and then scheduling an order transportation plan with manual intervention. Although, in the past, several trucks were required to deliver one bulk order to a channel partner's warehouse, the new routine was designed to ship a batch of online orders in one truck to the warehouse of the service point and then to deliver each order from the service point to the customer's home.

However, the initial refinement was far from sufficient. In comparison with B2B orders, which are characterized by large order quantities, large order

amounts, and small numbers of orders, the newly introduced B2C online orders were characterized by small order quantities, small order amounts, and large numbers of orders. Thus, the order distribution routine had to be reconfigured accordingly. Four major steps were taken.

Step 1: Acquiring management capabilities for the order distribution routine.

A major challenge arose soon after the transformation began: the Logistics Department lacked sufficient capabilities to manage online orders. The number of total orders increased dramatically, and the order content became significantly fragmented. With limited management capabilities, the Logistics Department could not maintain its high speed and high quality of order processing. This issue was common among actions within the order distribution routine, such as inquiries regarding product availability and transportation scheduling, and it introduced chaos into order processing. Informant #1, a manager of the Logistics Department, recalled, "*During the National Day sale [in 2011], we sold approximately 1,400 televisions. The management wanted a statistic about the order processing status. Where were these orders? What were the order statuses exactly? We spent seven days on it; we didn't even sleep, but we still couldn't figure out an answer!*"

To address this issue as a necessary step toward meeting expectations, a series of IT system implementations and upgrades transpired. A new order receiving and scheduling system was implemented in 2011, and the existing logistics information and service information systems were upgraded. These IT system improvements provided the Logistics Department with new resources to upgrade existing practices to IT-enabled logistic management. For

instance, the new visual monitoring system no longer required logistics staff to query the TC regarding product availability. Instead, stocking status was monitored directly via a visual monitoring system. Moreover, the previous manual transportation route scheduling became completely automatic. The IT capability improvement and the corresponding practice upgrades allowed for significant competence in online order management within the logistics team. Informant #1 provided an intuitive comparison of the effects: "(*In 2011, we couldn't manage 1,400 orders at the same time*) *but now* [*in a recent sale in 2012*], *we can easily manage the 50,000 orders placed just in one day. Now we can clearly get* [*the order processing status*] *from the reports generated in our system*."

Step 2: Refining expectations for the order distribution routine.

The upgraded IT system also facilitated the Logistics Department's discovery of consumers' preferences and needs by enabling online interaction with customers and corresponding data analysis. The company discovered customer needs that had previously been ignored, such as the importance of speedy delivery, the need to obtain an invoice when receiving an order, and the need for convenient product installation. Consumers' feedback introduced two new expectations to the order distribution routine. The first was ***speedy delivery***. Realizing the importance of delivery speed for online customers, Haier introduced the "24-hour shipping, money-back guarantee" service to online customers, which promised order delivery within 24 hours failing which the order payment would be waived. The other expectation was an ***integrated purchase experience***. The discovery of consumers' needs for invoice delivery and product installation convinced Haier that the separate

operations of different business functions resulted in multiple contacts with consumers, generating an inconvenient shopping experience, and that these operations should be unified. Based on such an idea, the integrated purchase experience aimed to provide high-quality service with minimum contact points, in particular, the customer could order all the products and raise all the customization requests via its e-commerce website, and get the order completely fulfilled at the time of delivery. These two new expectations initiated a series of changes.

Step 3: Developing the capability for speedy delivery.

After establishing the "24-hour shipping, money back guarantee" promise, the logistics staff soon realized that they did not have the capability to fulfill this promise due to many new issues, such as the limited delivery hours available to individual clients and erratic transportation times in the downtown area. Although some adjustments were made, the logistics staff experienced various setbacks in this process because of the existing arrangements. For instance, the staff overlooked the fact that online customers do not receive orders at midnight, unlike commercial warehouses. Informant #2, Director of IT Department remarked: "*There was a time our customers ordered products at midnight, and we delivered them at midnight — our logistics staff knocked on the door of the customer's home at 3 AM!*" To resolve these problems, the Logistics Department completely rescheduled the operation arrangements for its warehouses and delivery vehicles with regard to aspects such as inventory layout planning, the couriers' schedules, and appointment-making methods. After a long process of trial and error, the

Logistics Department finally developed the capability to deliver online orders within 24 hours.

Step 4: Integrating order-processing operations among business functions.

To provide an integrated purchase experience, a series of changes were made to the order distribution routine to introduce customer service upgrades, such as improved delivery appointments, an order progress-tracking tool, invoice issue on delivery, and installation on delivery. To integrate the operations of the Logistics Department and the e-commerce portal, the Logistics Department no longer arranged delivery time with consumers separately after receiving an order; instead, the e-commerce portal took over this operation, providing more options for customers and completing this step at the time of order placement. Additionally, by connecting separate internal IT systems in different departments, the online portal provided an "order progress tracking tool" that assisted customers in tracking all order updates on one platform. To integrate the operations of the logistics and Service Departments, a "printing order invoice" action was added to the order distribution routine so that the Service Department delivered both products and invoices at the same time. In addition, the ability to "coordinate the delivery schedule with the Service Department" was added to the order distribution routine so that customers could have their order installed at the time of delivery.

3.1.4.3 Reconfiguration of the Service Routine

As Haier's core products are home appliances, such as air conditioners and washing machines, providing post-sale, on-site services for product installation is compulsory. A core service routine involves order placement by the customer, a service appointment, on-site services, and customer feedback.

Service Routine: Before Reconfiguration

Prior to its e-commerce strategy implementation, Haier had established a capable service-point network and provided service after the retailer had delivered the order. In terms of service expectations, Haier aimed to attain customer satisfaction by providing excellent long-term service experience and had developed a good reputation for leading service quality.

The service routine prior to the transformation proceeds as follows. The service routine is triggered when the customers place a new order with any retailer. The Service Department receives the order information via the internal network or call center and then manually assign the order to one service point in the service-point network. The assigned service point makes appointments with clients for on-site service. The service team visits the client after the order has been delivered. During the on-site service, the service staff install the products for the customer and provide a product introduction and usage demonstration. At the conclusion of the on-site service, the staff brief the clients on the company's service policy, including a forthcoming telephone interview. After the on-site service has been successfully delivered, the order will be closed in the internal information system. Approximately one week after the installation, the call center calls the client for the after-service

interview to obtain the client's opinion on product usage and the on-site service experience. The call center summarizes the client's feedback and reports it to management. Finally, the Service Department settles the service charges for the parties involved in the processing of the order according to the customer's feedback regarding service quality.

Changes to the Service Routine

Although the existing service routine succeeded for online orders, the e-commerce business gradually created higher expectations; i.e., the service routine not only involved the experience in installing the products but also necessitated the complete user experience during the last-mile order delivery. To further improve service quality, three major steps were taken.

Step I: Enhancing the management capabilities of the service routine.

Similar to the order distribution routine, the service routine faced challenges with regard to its managerial capabilities. For instance, "order assigning" was an important action in the service routine in which the incoming order was assigned to one service point for follow-up actions. In the past, the order assignment was completed manually with the assistance of Haier's powerful offline retail network. However, the limited labor force became overwhelmed by the increasing number of online orders and could not assign them in a timely manner.

In response to this lack of managerial capabilities, the Service Department upgraded its internal IT system for greater competence. For instance, a four-dimensional digital map system was purchased so that all the order-assigning tasks could be completed automatically by the system without

the need for manual intervention. In particular, this four-dimensional digital map system can process the description of a customer' address in natural language, map it to the system's database, and automatically generate the precise longitude and latitude of the target address for further computing on the selection of service point in charge and the design of delivery route. This system made all these previously manual workload automated, significantly increased the company's managerial capabilities.

Step II: Emergence of "one-stop service".

The service routine was expected to provide the best user experience. Thus, when service staff discovered new service preferences and needs, they did their best to satisfy customers. For instance, when they observed that many consumers disliked waiting for product delivery and product installation separately, the Service Department introduced "installation on delivery" to the service routine. Service staff arranged their schedules according to the appointed delivery time and coordinated with logistics staff on the work schedule. Similarly, the Service Department introduced "invoice on delivery", allowing customers to receive products and invoices simultaneously. Moreover, the Service Department introduced "cash on delivery", which added the collection of payment to the service routine.

As the Service Department gradually initiated "installation on delivery", "invoice on delivery", and "cash on delivery", managers developed a deeper understanding of the provision of excellent service. Consequently, a "one-stop service" procedure was introduced and added to expectations for the service routine. This idea was more than a slogan; it continually generated

changes in the service routine. For instance, the Service Department planned "document collection on delivery", which involved the collection of completed documents at the time of delivery for the convenience of customers redeeming governmental allowances for purchasing of home appliances.

Step III: Emergence of "customized service".

To provide the best user experience, it was not sufficient to modify the service routine for the majority of customers because others might have unique requests that were not covered by the service scheme. For instance, during a Mother's Day sale, some customers who bought refrigerators for parents living far away from them wanted a card and flowers to be delivered along with the product. The service staff managed to satisfy this unconventional request to achieve the highest possible customer satisfaction. In another example, some customers living in rural areas, where poor road conditions prevented access for vehicles, needed their orders to be delivered to their front doors. To fulfill this request, the service staff carried the products on their backs over several miles.

Because of the many cases in which the staff attempted to satisfy customers' personal requests, these actions were summarized as "customized service" and added to the expectations for the service routine. Consequently, more effort was devoted to providing service options and opportunities for requests at the time of order placement, and the staff did their best to meet these requests. For instance, in collaboration with the Logistics Department, the Service Department provided numerous options for delivery appointments: customers could choose to have the order delivered within 24 hours, on a

chosen day within a short period, or on a chosen day in the future, with an appointed time that was accurate within two hours. The service staff routinized some of these practices to successfully satisfy consumers' additional requests.

3.1.5 Data Analysis

As mentioned in the introduction section of this study, I adopted the conceptualization of "routine as trajectory" as a theoretical lens to examine Haier's routine reconfiguration. I considered the expectations for the order distribution routine and service routine to be the trajectory projection, the detailed schemes designed for both routines to be the trajectory scheme, and the actual performances and outcomes of both routines to be the trajectory action. My data analysis revealed three pairs of interactions among the trajectory projection, trajectory scheme, and trajectory action, as I shall next discuss.

3.1.5.1 Interaction between the Trajectory Scheme and the Trajectory Action

The interaction between the trajectory scheme and the trajectory action (see Fig. 3-1) is evidenced by the acquisition of management capabilities (see Step 1 in Section 3.1.4.2 for detail) and the development of the capability for speedy delivery (see Step 3 in Section 3.1.4.2 for detail) in the reconfiguration of the order distribution routine as well as the process of enhancing management capabilities (see Step I in Section 3.1.4.3 for detail) in service routine reconfiguration. Next, I discuss this relationship in the following two subsections.

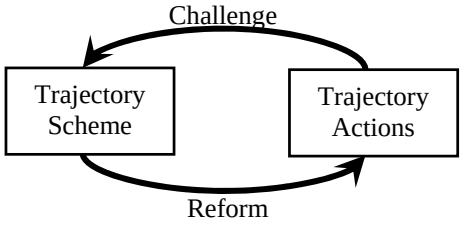


Figure 3-1 Interaction between the Trajectory Scheme and the Trajectory Action

The Trajectory Scheme Reforms the Trajectory Action

In routine reconfiguration, the altered trajectory scheme serves as a refined template for behavioral or normative goals, requiring the trajectory action to deviate from the original trajectory scheme. For instance, the refined repertoire of the order distribution routine after IT implementation was the template for order delivery practices until this repertoire was further revised for speedy delivery. The reform effect of refinements to order distribution is evidenced by the difference between the incapability to manage 1,400 orders in 2011 and the capability to manage 50,000 orders in 2012. This is consistent with what Feldman and Pentland (2003) call the ostensive aspect of the "guiding" performative aspect of a routine and what Nelson and Winter (1982) call the "routine as target". Only when the new trajectory scheme is performed in a repetitive and recognizable pattern can routine reconfiguration be considered complete.

The Trajectory Action Challenges the Trajectory Scheme

The trajectory action challenges the design of the existing trajectory scheme by providing a contrast between planning and performance. The trajectory scheme guides the trajectory action to follow the new action plans,

but the action does not necessarily adhere to the altered trajectory scheme, causing deviations in the performative aspect of a routine from the ostensive aspect of that routine. This deviation is due to two causes: *reflexive self-monitoring* or *external stimulus and feedback* (Feldman and Pentland 2003).

Reflexive self-monitoring occurs as we monitor ourselves (or others) before certain activities are begun. In the process of routine reconfiguration, reflexive self-monitoring is primarily reflected in the actors' realization of their incapability to perform the trajectory scheme as expected. For instance, when the Service Department began to process online orders, the trajectory scheme of the service routine specified that the "order assigning" task should be completed manually and that the service should be delivered within a limited time. However, in practice, the service staff realized their limitations in terms of human resources when completing this task and chose to process orders gradually. Hence, the trajectory action included manual order assignment, but the requirement for timeliness in completing the task was violated, challenging management with regard to the reasonableness of the design of this trajectory scheme.

External stimulus and feedback also cause practice to deviate from the plan because the performance of the trajectory scheme is subject to the "details of the performance" (Feldman and Pentland 2003). In routine reconfiguration, external stimuli and feedback are primarily reflected in the partial or complete conflict with the external context of the trajectory scheme. For example, in the case in which the logistics staff knocked on a customer's door at 3 am, the staff had delivered the order within 24 hours, as the trajectory scheme required; however, it is not customary for individual customers to accept delivery after

midnight, which is a contextual factor that is in conflict with the trajectory scheme, which is however shown in the trajectory action.

In either case, the trajectory action provides evidence of whether the trajectory scheme is executed smoothly, challenging the design of the trajectory scheme by indicating deviations between the trajectory scheme and the trajectory action. In routine reconfiguration, issues exposed in such deviations may impel the further refinement of the trajectory scheme when key individuals, such as managers or administrators, regard these issues as important. In the routine reconfiguration of both routines, the managers learned from the issues identified in practice and refined the trajectory scheme.

3.1.5.2 Interaction between the Trajectory Projection and the Trajectory Scheme

The interaction between the trajectory projection and trajectory scheme (see Fig. 3-2) is evidenced by the integration of order-processing operations among business functions (see Step 4 in Section 3.1.4.2 for detail) in the reconfiguration of the order distribution routine and the emergence of the "one-stop service" (see Step II in Section 3.1.4.3 for detail). I discuss this relationship in the following two subsections.

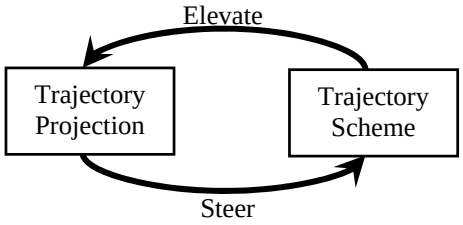


Figure 3-2 Interaction between the Trajectory Projection and the Trajectory Scheme

The Trajectory Projection Steers the Trajectory Scheme

In routine reconfiguration, the trajectory projection steers the trajectory scheme by indicating the vision and expectations for the performance of the trajectory scheme, which legitimates attempts to revise the current trajectory scheme. This steering effect is not a one-time effect in the formation of a trajectory scheme but is a constant effect throughout its evolution.

The trajectory scheme evolves according to internal and external environmental changes to carry out the trajectory projection. The design of the trajectory scheme is subject to the context of its formation, particularly in relation to agencies' knowledge and capabilities in realizing the trajectory projection. Hence, when staff become more knowledgeable or facilities are upgraded, a revised trajectory scheme can better express the same trajectory projection. For instance, after both the logistics and Service Departments upgraded their IT infrastructures, improved collaboration between staff in both departments was perceived. With the increased capabilities, the trajectory projection of the service routine could be delivered by introducing "installation on delivery" into the existing trajectory scheme. This service was initiated not because the trajectory projection was improved but because the

company attained increased capabilities to better realize the same trajectory projection.

A trajectory projection can also be improved during the process of routine reconfiguration, providing new directions and opportunities for the evolution of the trajectory scheme. For instance, when Haier decided to integrate order-processing operations, this additional objective improved the trajectory projection for both routines. Trajectory scheme refinements, such as an order progress-tracking tool and invoice issued on delivery, were initiated because of the revised trajectory projections.

To summarize, the trajectory projection steers the trajectory scheme in terms of both the formation and the adjustment of the scheme so that the trajectory scheme optimally concretizes the current trajectory projection.

The Trajectory Scheme Elevates the Trajectory Projection

The trajectory scheme elevates the trajectory projection by accommodating additional connotations. Because it is a detailed repertoire of activities, the ultimate objective of the trajectory scheme can be interpreted from different angles. For instance, the trajectory scheme of service routine, installation on delivery, invoice on delivery, and cash on delivery, which were all derived from the strategic vision of customer satisfaction, can be interpreted as efforts to attain customer satisfaction and a design for one-stop service. Even when the trajectory scheme adheres to the projection, the interpretation of the trajectory scheme may shed lights on new ideas that go beyond what the trajectory projection has defined. In particular, as a concrete manifestation of existing trajectory projection, trajectory scheme reflects

various attempts towards the goal of the routine. When putting these attempts together, they may contain extensive connotations, which allow managers of routine to selectively conceptualize new ideas regarding existing trajectory projection. For instance, in Haier's case, the manager of the Service Department extracted the idea of "one-stop service" from a series of actions in existing trajectory scheme. Consequently, the trajectory projection can be improved and extended, giving the trajectory scheme new space into which to evolve.

3.1.5.3 Interaction between the Trajectory Projection and the Trajectory Action

The interaction between the trajectory projection and the trajectory action (see Fig. 3-3) is evidenced by the refinement of expectations for the order distribution routine (see Step 2 in Section 3.1.4.2 for detail) and the emergence of the "customized service" (see Step III in Section 3.1.4.3 for detail) in the service routine reconfiguration. I discuss this relationship in the following two subsections.

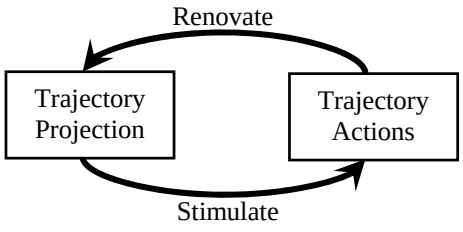


Figure 3-3 Interaction between the Trajectory Projection and the Trajectory Action

The Trajectory Projection Stimulates the Trajectory Action

The trajectory projection stimulates the trajectory action by legitimating it. The guiding principles articulated in the trajectory projection assist staff in understanding the goals of their behavior to produce the trajectory action that is consistent with projections (Orbuch 1997; Scott and Lyman 1968). For instance, to satisfy customers by offering door-to-door delivery, service staff carried products on their backs for several miles in rural areas. Accounting for a consistent trajectory action is not limited to seeking approval from supervisors; it also includes support from colleagues. For instance, during the Mother's Day sale, when the e-commerce portal staff received special delivery requests, they believed that satisfying these requests was consistent with their ultimate goal of providing the best user experience to customers. Thus, they communicated with the logistics and Service Departments to complete these requests. The stimulating effect of the trajectory projection generates new ideas. This concept is consistent with what Feldman and Pentland (2003) referred to as the ostensive aspect of a routine "accounting for" the performative aspect of a routine.

The Trajectory Action Renovates the Trajectory Projection

The trajectory action renovates the trajectory projection by providing inspirational materials. After managers have identified visions of the trajectory action, they can modify the current trajectory projection. The valuable materials inherent in the trajectory action may be *contextual information* or *initiative practices*.

The trajectory action, which captures the contextual information of performing a trajectory, provides valuable information regarding how to

interact with the context to better specify the trajectory projection. For instance, when initiating the order distribution routine, the logistics staff collected considerable customer feedback. They found that customers wanted faster product delivery, leading to the addition of "speedy delivery" to the trajectory projection. Initiative practices, which are developed and performed by related actors according to the circumstances, show how the trajectory action deviates from the trajectory scheme in response to uncertain contexts. Initiative practices implicitly involve approaches for better interactions within the context, so they may enhance an existing trajectory projection. For instance, during the Mother's Day sale, delivering a card and flowers with the order was an initiative practice generated by operational staff in response to customers' special needs. Similar suggestions led the management to extract the idea of "customized services" from these practices and add it into the trajectory projection of the service routine.

3.1.6 Discussion and Findings: Critical Roles of Routine Reconfiguration

The aforementioned data analysis presents the dynamics of routine reconfiguration from the theoretical lens of trajectory. In general, it suggests that the dynamics among different trajectory elements may lead to the outcome of routine reconfiguration. While this corroborates to the prior literature that the ostensive aspects and performative aspects of routine interact with each other and lead to the variation of routines (Feldman and Pentland 2003), it demonstrates the detailed dynamics along such evolution, and various outcomes that are important for the case organization. To further address my research question, I went through an iterative process involving the relevant

literature, qualitative data, and the emerging model, and inductively derived a model of three distinct roles of routine reconfiguration, which I have summarized in Table 3-1. I describe how the existing literature corroborates the model and how the model enriches my present understanding of routine reconfiguration.

3.1.6.1 Routine Reconfiguration as Deconstruction of Operational Inertia

Operational inertia refers to the inability to enact internal change in organizational operations in the face of significant external change (adopted from Miller and Friesen 1980; Tushman and Romanelli 1985). Because of operational inertia, organizations tend not to change, and when they do, they respond slowly to environmental threats and opportunities and are more likely to disband than adapt (Hannan and Freeman 1984). A significant body of evidence demonstrates the importance of organizations' intentional deconstruction of operational inertia and the introduction of changes based on environmental changes, which increases organizations' chances of survival (c.f. Delacroix and Swaminathan 1991; Kelly and Amburgey 1991; Stoeberl *et al.* 1998). Even discontinuous environmental change is not associated with an increased probability of organizational change (Kelly and Amburgey 1991).

In the context of e-commerce strategy implementation in traditional companies, the deconstruction of operational inertia is remarkably important. According to the literature on organizational learning, the particular set of routines to which an organization becomes committed is determined more by early actions than by information gained from learning situations (Levitt and March 1988). Thus, when e-commerce strategies are initiated, a traditional organization has already committed to a particular set of organizational

routines with strong inertia against change. These routines will likely be less efficient and effective after the transformation begins, threatening the organization's survival.

I argue that routine reconfiguration deconstructs operational inertia in e-commerce strategy implementation in traditional companies. This role occurs through the interaction between the trajectory scheme and the trajectory action: the trajectory scheme reforms the trajectory action, and the trajectory action challenges the trajectory scheme. Because the trajectory scheme changes in response to environmental changes, it can be viewed as an organization's operational script to deconstruct operational inertia. The trajectory action carries out and deviates from the trajectory scheme. Accordingly, the trajectory action can be considered to provide iterative empirical tests of the initial or altered trajectory scheme, reflecting deviations caused by internal and external factors that were previously ignored by managers. Hence, the challenging effect of this interaction promotes the deconstruction of operational inertia by noting blind spots and inspiring changes in the trajectory scheme. Through the combination of the reforming and challenging effects, routine reconfiguration deconstructs an organization's operational inertia by constantly revising the trajectory scheme and enacting the revised trajectory scheme.

3.1.6.2 Routine Reconfiguration as Reposition of Strategic Intent

Strategic intent refers to the ambitious and compelling purposes of an organization and "captures the essence of winning" (Hamel and Prahalad 1989). In addition to an organization's long-term vision, the concept of strategic intent encompasses management processes such as focusing the

organization's attention on its ultimate purpose, providing new operational definitions as circumstances change, and using intent to guide resource allocations consistently (Hamel and Prahalad 1989). Strategic intent evolves, but this evolution may not be easy. The leaders of an organization may suffer from psychological sources of strategic inertia, which limit the evolution guided by the ultimate strategic intent (Burgelman 2002). For instance, cause-effect beliefs that may not hold after the environment changes may become ingrained in executives (Bettis and Prahalad 1995). Therefore, it is necessary for an organization's strategic intent to continually evolve with changes in the environment. In my research context, this requirement is even more critical because a traditional company undergoing this process usually faces dramatic changes in strategic intent, particularly with regard to business definition, models, and goals. Strategic intent in routine reconfiguration is represented by trajectory projection, which defines the mission, business, and goals of a particular routine.

I argue that in traditional companies, routine reconfiguration repositions an organization's strategic intent in e-commerce strategy implementation through the interaction between the trajectory projection and the trajectory scheme: the trajectory projection guides the trajectory scheme to align with the trajectory projection and thus legitimates its changes, while the trajectory scheme elevates the trajectory projection. Because the alteration of the trajectory scheme is not only guided by the trajectory projection but also influenced by the internal and external environment, the revised trajectory scheme can be considered a pool of practices that concretize the current trajectory projection and reflect changes in the environment. Thus, the revised

trajectory scheme accommodates rich connotations of strategic intent and provides valuable insights into how strategic intent evolves in response to environmental change. Hence, the steering process can be considered as the material-generating process in repositioning strategic intent.

Through the elevating effect, the trajectory projection is revised by extracting the valuable vision embodied in the trajectory scheme. In other words, the elevating process repositions strategic intent. In my research context, the steering effect provides rich material for the elevating effect because a dramatic change in the trajectory scheme is required. Nevertheless, it takes time for managers to accumulate sufficient understanding of the environment to change strategic intent.

Considering the steering and elevating effects together, routine reconfiguration can reposition the strategic intent of an organization by constantly providing raw material via the trajectory scheme and selectively processing the material when refining the trajectory projection.

3.1.6.3 Routine Reconfiguration as Rejuvenation of Flexibility and Innovation

Routine reconfiguration leads to the reconfiguration of organizational capabilities because organizational routines are the enactment of organizational capabilities (Feldman and Pentland 2003; Pan *et al.* 2006). To reconfigure their capabilities, organizations must replace existing capabilities with newly acquired ones. Although deconstructing operational inertia and repositioning strategic intent affect this process by removing existing capabilities, new capabilities are also needed. During this process, both

flexibility and innovation are important: flexibility aids an organization in responding to and managing environmental changes, and innovation is a key driver of capability reconfiguration (Lavie 2006). I define flexibility as the ability to adjust e-commerce processes to customer preferences. Innovation is defined as the adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the organization (Daft 1982; Damanpour and Evan 1984; Zaltman *et al.* 1973). In the context of e-commerce strategy implementation in traditional companies, prior to the change, the organization usually lacks the level of flexibility and innovation required for this transformation because it lacks an in-depth understanding of e-commerce and the technological innovations required for e-commerce. Hence, rejuvenated flexibility and innovation are vital for a traditional organization to develop new capabilities that are appropriate for e-commerce.

I argue that routine reconfiguration rejuvenates flexibility and innovation in e-commerce strategy implementation in traditional companies through the interaction between the trajectory projection and the trajectory action. Through the stimulating effect of this interaction, the trajectory projection stimulates the emergence of a trajectory action that is new to the trajectory scheme by legitimating the trajectory action in accordance with the trajectory projection. Through the strategic intent, the trajectory projection incorporates expanded targets that impel companies to compete flexibly and innovatively (Hamel and Prahalad 1989). Hence, the stimulation process generates flexible and innovative ideas. The trajectory projection is renovated by extracting the flexible and innovative ideas of the trajectory action. Considering the stimulating and renovating effect together, routine

reconfiguration can rejuvenate an organization's flexibility and innovation by encouraging flexible and innovative ideas and utilizing them in the trajectory projection.

Table 3-1 Summary of the Roles of Routine Reconfiguration

Roles of Routine Reconfiguration	***Content***
Deconstruction of Operational Inertia	Demolishing the inability to enact internal change in the operation of an organization in the face of significant external change.
Reposition of Strategic Intent	Replacing the previous ambitious and compelling purposes that the organization strived for with new ones.
Rejuvenation of Flexibility and Innovation	Restoring the ability to adjust e-commerce processes to customer preferences, and the ability to adopt an internally generated or purchased device, system, policy, program, process, product, or service that is new to the organization.

3.1.7 Conclusions and Future Research Directions

3.1.7.1 Theoretical and Practical Contributions

This study contributes to the literature on e-commerce strategy in several ways. First, it suggests the importance of understanding e-commerce strategy implementation in e-commerce strategy literature. While e-commerce strategy implementation has often been overlooked in the extant literature, this study provides compelling evidence of the critical value of such strategy implementation in achieving successful e-commerce adoption. In particular, routine reconfiguration, as the process of strategy implementation, enriches and assists organizations in implementing e-commerce strategies, thereby indicating the strategic value of including implementation approaches into traditional companies' e-commerce strategies. In other words, a traditional

company aiming to engage in e-commerce should not only devise an e-commerce strategy but also consider how to transit from its current practices to its desired practices. I anticipate that this knowledge can shed light on future studies on e-commerce strategy.

Second, this study extends our understanding on e-commerce strategy implementation from the perspective of routine reconfiguration, and provides a framework for understanding the roles of routine reconfiguration in e-commerce strategy implementation. As e-commerce strategy implementation has been underexplored, we have limited knowledge on how to guide traditional companies toward expected e-commerce outcomes. By presenting a case study of routine reconfiguration through which a traditional company successfully implemented its e-commerce strategy, I empirically identified three roles of routine reconfiguration in e-commerce strategy implementation. Given the significant challenges of managing organizational routines due to organizational inertia and a lack of flexibility and innovation (Johnson 1988), this study provides a valuable in-depth discussion on e-commerce strategy implementation in a traditional company.

Third, this study unveils the interactions among different components of routines (i.e., trajectory projection, trajectory scheme, and trajectory action) in e-commerce strategy implementation. Although most studies have treated the routine as a unit of analysis to observe organizational change, few studies have examined routine reconfiguration by investigating the interactions among the components of organizational routines. Our research contributes to filling this gap by adopting the conceptualization of “routine as trajectory” in analyzing routine reconfiguration. My findings enrich the e-commerce

literature by identifying the mechanisms of routine reconfiguration through this conceptualization of routines, and thus providing a better understanding of how e-commerce strategy implementation can be managed. I expect that this study will stimulate additional studies utilizing the conceptualization of "routine as trajectory".

This study also has practical implications. First, this study provides insights into how to implement e-commerce strategies from the perspective of routine reconfiguration. My research highlights the importance of routine reconfiguration in such transformation and demonstrates that routine reconfiguration is not a revolutionary change that occurs overnight but an evolutionary process. Second, this study provides insights into how to reconfigure routines by managing the interactions among the trajectory projection, the trajectory scheme, and the trajectory action. My research demonstrates that routine reconfiguration involves improving the concreteness and richness of a company's strategic vision, enhancing the staff's understanding of best practices, and increasing organizational capabilities. It is worth noting that the practical implications of this study may not be limited to emerging e-commerce markets, in which a large number of traditional companies are at the early stage of e-commerce adoption, but may benefit practitioners in more mature e-commerce markets by shedding light on how to further refine established operational routines within their e-commerce practices. Given the highly turbulent nature of the e-commerce industry, constant effort concerning routine reconfiguration is crucial for existing e-commerce businesses to remain adaptive and competitive.

3.1.7.2 Limitations and Future Research Directions

Despite providing fresh insights, this study is not without limitations. First, case study methodology is commonly criticized regarding the problem of generalizability or external validity (Walsham 2006). I must acknowledge that statistical generalization is impossible with only one case, and the aim of this study is not to establish the validity or statistically test the generalizability of a particular finding (Staudenmayer *et al.* 2005). However, I assert that my findings are valid, and can be generalized beyond the organizational context examined, because they are not only grounded in the observed reality of real organizations but are also corroborated by some of the most established work in routine literature and e-commerce literature. Future studies may examine my findings in other contexts as well.

Second, this study mainly focuses on the reconfiguration of intra-organizational routines because the case organization itself is capable of performing most e-commerce-related operations, including logistics and services. However, in the modern business environment with highly complex and specialized divisions of labor, it is necessary for most organizations in the e-commerce industry to coordinate with a number of business partners, such as product suppliers, logistic providers, and service outsourcing companies. Consequently, future research could examine the reconfiguration of inter-organizational routines in the transformation of traditional companies toward e-commerce capabilities.

Third, routine reconfiguration, which is the focus of this study, is merely part of an organization's endeavor in its acquisition of e-commerce capabilities. There may be other routine-related issues in this process, such as

routine creation and routine transfer. Future studies could further enrich my knowledge regarding e-commerce strategy implementation in the light of the above issues.

Fourth, while this study explores the interactions among trajectory elements in the process of routine reconfiguration, the comprehensive relationships among trajectory elements is not the main purpose of this study. Future research could further investigate such a relationship for a better understanding of routine dynamics from a trajectory perspective.

3.1.7.3 Conclusion

This case study investigates the roles of routine reconfiguration and the corresponding mechanisms in the e-commerce strategy implementation of traditional companies. By adopting the conceptualization of organizational routine as trajectory, I elucidate the interactions among an organizational routine's trajectory projection, trajectory scheme, and trajectory action and the importance of managing routine reconfiguration during e-commerce strategy implementation. This study suggests that future research in this area is theoretically and practically important.

3.2 Study II: IT-Enabled Reconfiguration of Interconnected Routines: A Trajectory Perspective

3.2.1 Introduction

Organizational routines have been investigated in organizational studies for decades because of their pervasiveness and significance (March and Simon 1958; Cyert and March 1963; Nelson and Winter 1982; Levitt and March 1988; Gersick and Hackman 1990). Organizational routines have been regarded as the primary means by which organizations accomplish much of what they do (Cyert and March 1963; March and Simon 1958 [1993]; Nelson and Winter 1982). Organizational routines are not only pervasive in organizational behaviors, but also serve significant roles. Organizational routine is a major source of organizational competence, as well as a major source of organizational stability (Cyert and March 1963; March and Simon 1958 [1993]; Nelson and Winter 1982; Simon 1947/1997; Stene 1940).

Despite benefits to an organization, organizational routines are also potentially destructive to an organization. Organizational routines may give rise to organizational inertia and rigidity when being performed in inappropriate situations (Hannan and Freeman 1984; Gersick and Hackman 1990; Weiss and Ilgen 1985; Gilbert 2005). For instance, in an organization without ERP systems, a salesman follows the routine to record clients' information in his notebook. Yet if he continues to do so after the organization implementing ERP systems with CRM modules, the old routine becomes inertia for the organization. Hence, routine reconfiguration is critical for an organization to seize the significant value and mitigate the potential harm caused by organizational routines.

Thanks to the improved conceptualization of organizational routines in recent years (Feldman and Pentland 2003), which has enabled researchers to undertake in-depth investigation of the dynamics of routines, there has been an emerging research interest on routine reconfiguration (e.g., Obstfeld 2012). However, literature on routine reconfiguration is still limited. For instance, extant routine studies have generally focused on the exploration of a single routine, yet, I have little knowledge regarding the complex dynamics among multiple interconnected routines (D'Adderio *et al.* 2012). Therefore, this study aims to understand how to reconfigure interconnected routines.

The reconfiguration of interconnected routines differs from the reconfiguration of a single routine in the sense that it involves much coordination among these interconnected routines. For instance, in some manufacturing companies, before products are dispatched as part of the logistics routine, relevant staff need to seek permission which is generated after the Finance Department has completed a series of accounting routines. In such a system of interconnected routines, changing one routine affects its interconnected routine. The company can only optimize its performance after successfully coordinating the performance of the logistic and accounting routines. Otherwise, even when both the Logistics Department and Finance Department have coordinated their routines respectively, the company may still experience poor efficiency and effectiveness.

Closing this research gap is important mainly for three reasons. First, addressing this gap contributes to our understanding on the routine dynamics in a system that consists of multiple routines, which is part of the ecologies of routines. Prior routine studies has mainly focused on single routines

(D'Adderio *et al.* 2012). Yet, in modern organizations, routines exist and perform not in a vacuum, but in a system where multiple interconnected routines exist and collaborate together. Given the consensus that routines play critical roles in an organization (Cyert and March 1963; March and Simon 1958 [1993]; Nelson and Winter 1982), to understand how these interconnected routines can possibly interact with each other would provide insights on how to better manage a set of organizational routines cohesively at an organizational level, instead of to manage one particular routine without considering its corresponding effects.

Second, addressing this research gap enhances our knowledge on how organizational transformation should be conducted from the perspective of organizational routine. This is important because the reconfiguration of interconnected routines is a fundamental and significant challenge in the process of organizational transformation. Without changing the interconnected routines, organization cannot perform as expected on a regular basis. Meanwhile, the difficulties here are two-fold. First, the rigidity of each organizational routine has to be overcome for successful organizational transformation (Gersick and Hackman 1990; Gilbert 2005; Hannan and Freeman 1984; Weiss and Ilgen 1985). Meanwhile, and more characteristic in the reconfiguration of interconnected routines, the coordination among those simultaneously-changing routines needs to be well managed for better organizational performance (Barnett and Freeman 2001; Carlile 2004; Kumar and Van Dissel 1996).

In fact, many organizations fail to perform well not only because of certain inappropriate routines, but also due to the lack of effective

coordination among a set of interconnected routines (Brandts and Cooper 2006; Gosain *et al.* 2005). In the process of organizational transformation, it is common that most business functions are requested to change their business practice by a leading department or top management. However, any unilateral-change in one organizational routine may render the efforts inherited in the changing process ineffective if its interconnected routines remain the same or unfit. The failure of the transformation of General Motors (GM) for better productivity between the 1970s and 1980s is a widely cited example. After GM being aware of the nature of the company's productivity gap, the company spent tremendous effort to address this issue, including introducing Toyota's world-class management methods into the organization. Adopting the successful practices of a leading peer company seemed to be helpful, as each business functions had a proven template to follow. However, GM could not improve its productivity. Rather, many GM plants became even less productive. When routines of each business functions have changed in a Toyota way, the coordination of these routines seems to be the key causes of failure.

Third, this research gap is of increasing importance in the context of contemporary organizations, where the growing application of information technologies, such as enterprise systems, further enhances the need to coordinate interconnected routines. Enterprise systems (ES) may improve organizational performance by integrating the organizational behaviors carried out by different business functions, so that information flow throughout the organization can be more efficient and effective. While ES may boost organizational coordination by facilitating information exchange within an

organization, ES also renders the phenomenon of interconnected routines more pervasive than previously. Hence, the usage of ES both intensifies the opportunities and demands to reconfigure interconnected routines for better coordination. Therefore, in the IT-enabled business environment, understanding reconfiguration of interconnected routines has increasingly significant practical implications for improving organizational performance.

To fill the research gap on how to reconfigure interconnected routines, this study investigates the approaches to reconfigure interconnected routines. In particular, I draw on the conceptualization of "routine as trajectory" (Strauss 1993), in which routines are considered to be trajectories of interdependent actions through which organizations accomplish much of what they do (Becker *et al.* 2006; Obstfeld 2012). Adopting this conceptualization of routines enables me to analyze an organizational routine as a set of components of a trajectory, in order to categorize reconfiguration of interconnected routines into three kinds of trajectory reconfigurations regarding different trajectory components respectively.

Using a case study of Wanhua, the third largest isocyanate manufacturer in the world that had experienced a large-scale IT-enabled routine reconfiguration, this research aims to understand how an organization reconfigures its interconnected routines in the context of IT-enabled organizational transformation. Specifically, I adopt the conceptualization of "routine as trajectory" to investigate different approaches of reconfiguration of interconnected routines in Wanhua's transformation. Thus, this study aims to provide fresh insights into how to reconfigure interconnected routines. Accordingly, the research question of this study is as follows:

How does an organization reconfigure its interconnected routines?

3.2.2 Literature Review of Knowledge Management

To address the research gap, we begin with a review of the literature on knowledge management. Knowledge management is a set of management activities aimed at designing and influencing knowledge creation and integration (McIver *et al.* 2013). This is an appropriate starting point for my inquiry on inter-routine reconfiguration, because an organizational routine, which captures rich procedural knowledge of an organization in particular areas (Nelson and Winter 1982; Teece and Pisano 1994; Teece *et al.* 1997), can be essentially viewed as a set of executable business domain knowledge (Alavi and Leidner 1999; Alavi and Leidner 2001). In such sense, the reconfiguration of interconnected routines can be also considered as a process of knowledge management.

Based on the literature, to understand the process of knowledge management in the focal context involves the following aspects: a space for knowledge creation (Nonaka and Konno 1998), the design of knowledge management practices (Ancona and Caldwell 1992), and the implication of knowledge management practices (McIver *et al.* 2013).

First, prior literature suggests that organization needs a context for knowledge creation to take place (Nonaka and Konno 1998). Such context, which can be labeled as ‘space’, could be physical, virtual or mental spaces, as long as there is knowledge embedded in it for knowledge sharing (Nonaka 1994; Nonaka *et al.* 2006). Different types of knowledge within different types

of space may cultivate various consequences of knowledge creation (Nonaka and Konno 1998).

Second, the design of knowledge management practices is necessary. In inter-routine reconfiguration, knowledge boundary emerges, since each routine captures different practice or expertise, which is formed based on the assumptions that only insiders take for granted, and incorporates tacit knowledge that can be only understood in practice (Carlile 2004; Pan *et al.* 2007a). To overcome such knowledge boundary, certain strategic design of knowledge management practices, which provides the patterns of externally oriented activities, becomes critical for necessary knowledge transfer (Ancona and Caldwell 1992). Prior literature have examined this issue from the perspective of structure (e.g., Marrone *et al.* 2007; Tushman 1977) and the perspective of orientation (e.g., Ancona 1990; Ancona and Caldwell 1992). Both of them constitute the configuration pattern of knowledge transfer. Moreover, the content to be transferred is also critical (e.g., Levina and Vaast 2006; Schultze and Orlikowski 2004). In this research context, the particular knowledge to be shared about the focal routines largely depends on the actors in the practices. As such, I identify the design of knowledge management practices with two key components: (1) the configuration pattern of knowledge transfer, and (2) the key actors in knowledge transfer.

Last but not least, it is valuable to understand the implication of such knowledge management practices. Prior literature suggests that knowledge management may yield various outcomes, such as higher productivity (Wiig and Jooste 2003), enhanced innovation and product development (Pitt and MacVaugh 2008), and advanced operational effectiveness (Hult *et al.* 2004).

While prior literature provides a valuable foundation, this study to examine the implications of inter-routine reconfiguration may provide fresh insights in its important role in IT-enabled organizational transformation.

3.2.3 Methodology

As mentioned in Chapter 2, this study adopts case research methodology with the Wanhua Group as case organization. Regarding the data collection and analysis, the theory-building process prescribed by Eisenhardt (1989) in designing and conducting this case study. After negotiating with the case organization and obtaining case access in October 2013, I initially spent one month to collect and analyze archival materials from multiple sources, including Wanhua's official website, internal documents, media coverage, books, social media, etc. By scanning these materials, I conducted a preliminary identification of the phenomenon (Pan and Tan 2011) before onsite data collection. Meanwhile, I reviewed literature from top management and IS journals to form my theoretical lens (Walsham 2006), and identified routine reconfiguration as the "anchor point" of this study. Based on the iterative analysis of the secondary data and extant literature, I derived a "sensitizing device" (Klein and Myers 1999; Pan and Tan 2011), consisting of a set of pertinent theories, constructs, and arguments, in order to guide the subsequent data collection and analysis (Eisenhardt and Graebner 2007).

I collected onsite data at Wanhua's headquarters in Yantai in November 2013. A total of 12 semi-structured group interviews with an average of two informants per group were conducted. The group interview allows interviewer to facilitate a comprehensive exchange of views among interviewees, providing the advantage that ideas may be generated which

would not have occurred to any one individual. The total interview duration is about 15 hours. The informants comprised top management, middle management, and subordinates, and included the CIO and directors, in order to gain a comprehensive understanding on the case organization's operation and transformation from the perspectives of different business functions and different hierarchical levels. I inquired as to how each department defined and fulfilled their regular work before their large-scale refinement of their regular work, what the managerial decisions made by the management team were, and the corresponding changes that occurred in the organization. As the primary data source, these interviews, which lasted an average of 60–90 minutes, were digitally recorded and transcribed into an equivalent single document of more than 150 pages (10.5pt font and single-line spacing) for subsequent data analysis. In addition, these interviews were corroborated by secondary data sources, including internal documents, field notes, and other archival materials collected before onsite data collection. Using multiple data sources, I triangulated the data collected in order to substantiate my constructs and hypotheses (Eisenhardt 1989).

I commenced data analysis at the time of data collection, in order to benefit from the flexibility offered by the case study method (Eisenhardt 1989; Pan and Tan 2011). The research focus on reconfiguration of interconnected routines sensitized me to the related information on the transformation of Wanhua regarding its various organizational routines. The "open coding" and "selective coding" techniques were adopted during this process. First, along with the data collection, we organized the case through "open coding" (Strauss and Corbin 1998), in which the data were broken down into conceptual

categories (Walsham 2006). The pieces of categorized data were then examined, compared for similarities and differences, and organized into the themes.

Next, we started the "selective coding" (Strauss and Corbin 1998), which is a process for researchers to develop a theoretical model based on prior literature as a theoretical scaffold. A combination of narrative and visual mapping strategies was adopted to manage the large amount of data collected (Langley 1999). The narrative strategy is essentially about summarizing the primary and secondary data collected in the form of a story, while the visual mapping strategies may help the researchers visualize the order of events, and better clarify the sequential and causal relationships among the events and consequences. Narratives about the changes in routines along the organizational transformation, the processes of enacting these changes, the roles of ES in these processes, and the organizational contexts of these processes were summarized in tables and diagrams, based on which I further extracted the theoretical concepts. Based on my theoretical lens from the trajectory perspective, I also highlighted the descriptions regarding the expectations, arrangements, and actual performances of the routines. Subsequently, how the company conducted the three types of routine reconfiguration involving changes of the three types of trajectory components based on its ES were summarized. Accordingly, I identified tentative concepts for explaining the processes of each type of routine reconfiguration and constructed my initial theoretical model. Next, I spent another two months on the process of moving back and forth iteratively among empirical data, relevant literature, and the emerging model, in order to ensure the alignment

among them. By doing so, I further validated and revised the initial theoretical model. This process reached its end when "theoretical saturation" was achieved (Glaser and Strauss 1967; Pan and Tan 2011).

3.2.4 Case Description

3.2.4.1 Organizational Background

Wanhua Chemical Group Co., Ltd. (hereafter "Wanhua") is a listed shareholding chemical enterprise headquartered in Yantai, Shandong, PRC. Founded in 1998, the company has been expanding rapidly in recent years, and has developed world-leading technologies and capacity in the production of MDI, a widely produced isocyanate that is widely applied as a key material in many industries, including chemical, lighting, textile, construction, transportation, automobile and aviation industries, etc. Wanhua presently is the largest MDI manufacturer in Asia-Pacific area, and the third largest isocyanate manufacturer in the world. In 2012, Wanhua had an annual revenue of USD $2.626 billion and a net profit of USD $386.858 million, and employed over 20,000 employees.

Despite Wanhua's superiority in MDI production technologies, which propelled the company's annual MDI production capability from 15,000 tons in 1999 to 1.2 million tons in 2013, the company had been facing significant managerial challenges. The efficiency and effectiveness of its business practices was not compatible with the massive production volume and market demands. Without leveling up its existing business practices, the company couldn't complete so many orders from clients timely. As a result, the company decided to reform its business practices in order to increase its

overall productivity via Enterprise Systems (ESs), which render the integration and optimization of business practices technically possible. Accordingly, in 2008, the company implemented a set of Enterprise Resource Planning (ERP) system to initiate such organizational transformation. Followed by a large scale routine reconfiguration efforts, the company successfully overcame its bottom neck on production and management capability, and doubled its annual production volume within 5 years.

3.2.4.2 Three Types of Routine Reconfigurations in Wanhua

After the ERP system was implemented, the company soon realized that having the ERP system alone was not sufficient. A key hindrance of Wanhua's organizational transformation was the company's existing interconnected routines. Despite the ERP systems being highly advanced, the organization could not transform its practices immediately as the way staff using ERP remained old-style and the ERP was far from fully utilized. Moreover, since these existing routines collaborate and serve the same organizational goals essentially, they were often interconnected with each other, and together capture how the organizational members behaved regularly. In many cases, the improvement of one particular business practice requires changes on multiple routines simultaneously. Therefore, the organization needed a large-scale reconfiguration of interconnected routines to unleash the potential competencies brought by ERP.

Such routine reconfiguration was not easy to achieve. This was not only due to the inertia to embark changes on the habits of organizational member. More critically, how to trigger and evolve reconfiguration of interconnected routines became the crux of Wanhua's IT-enabled

transformation. In other words, the organization had difficulties figuring out where and how to evolve existing routines towards ERP-enabled close collaboration among different business functions. This was because the company's specialists of each business functions knew little about other departments in their prior job experiences. Yet, changing one routine alone without managing its interconnected routine could not improve internal collaboration.

Therefore, in order to successfully achieve routine reconfiguration in its IT-enabled organizational transformation, the management team of Wanhua acknowledged the importance of knowledge sharing and knowledge transfer within the organization. They realized that, since ERP enables the business practices to be better integrated, each business function needs more knowledge about other business functions for better coordination among each other. Accordingly, Wanhua purposely promoted three corporate policies for cultivating generalists instead of specialists, as key approaches to complete its organizational transformation.

Hence, Wanhua's routine reconfiguration after its ES implementation formed the research context of this case. I examine the three approaches and reconfiguration processes of Wanhua as in the following subsections. Furthermore, detailed quotations are provided in Appendix B for readers' further references.

It is worth noting that, among fruitful knowledge to be shared, two types of knowledge were identified as particularly important for every business functions: IT knowledge and accounting knowledge. The IT

knowledge was considered important as it relates to the actual adoption of the ERP systems in each department. The accounting knowledge was considered important because Wanhua's top management viewed ERP system essentially as a set of accounting software. Wanhua's top management believed that the acquisition of accounting knowledge could lay a critical foundation for staff to understand how the operations of ERP were designed, and adopt the system quickly and smoothly. Accordingly, a significant amount of knowledge sharing events is related to the two types of knowledge. Next, I describe the approaches used by Wanhua.

Routine Reconfiguration Brought on by Managerial-Level Internal Job Rotation

In order to facilitate Wanhua's organizational transformation for higher productivity via ERP implementation, the company designed a distinctive corporate policy for key managerial talents: all young managers (approximately below age 40) are expected to rotate to the managerial positions in other business functions regularly (about 2–3 years per rotation). Unlike the common job rotation that is often designed for new employees to quick explore different functionalities of the company until they choose to stay in a particular department, such managerial-level internal job rotation is designed for experienced managers that play critical roles in their departments to rotate to a new department regularly. This is primarily due to the top management's belief that the most competitive managers shall have comprehensive knowledge about all business operations.

Accordingly, many young managers, who have not reached the top management level, had been experiencing drastic job rotations several times due to this policy. For instance, Informant #5, who used to be a manager in the IT Department, later became a manager in the Production Department; while Informant #6, who used to work in the Production Department, later moved to the Marketing Department as a manager in logistics support; Mr. Chi, who was also a manager in the IT Department, was later rotated to the Operation Center; and Informant #1, was rotated from the IT Department to the Finance Department.

Regarding the effect of such managerial-level internal job rotation, Informant #3's experience as one of these young managers are highly representative. Informant #3 had been working for the Finance Department in Wanhua for about five years. The Finance Department is responsible for all of the financial aspects of a company by providing accounting and financial services. Essentially, the mission of Finance Department is to ensure the financial security of the organization, and to bring greater financial value to the organization. This ultimate mission penetrates all the regular or non-regular business practices of Finance Department. As a financial expert, Informant #3 also had this mission inscribed in his mind, and he did a very good job.

Despite being a very capable financial expert and knowing relatively little about procurement, Informant #3 was rotated to the Procurement Department as an Assistant of the General Manager in recent years, due to the company's managerial-level internal job rotation policy. The company expected Informant #3 to further develop himself in his new position,

meanwhile leverage his financial and accounting expertise for a better Procurement Department.

This job rotation decision was meaningful, since the routines in the Procurement Department are highly relevant to many routines in the Finance Department. On the one hand, the procurement job generates massive financial transactions, which involves substantial amount of accounting services from the Finance Department. On the other hand, procurement is a major activity that influences the company's financial situation. As a large manufacturing company, Wanhua had to purchase over 100,000 types of materials yearly, with an annual purchasing budget of over USD $1.7B. As the company continued to expand rapidly, the procurement value is expected to reach USD $5.1B in 2015. In such a circumstance, every single cent saved from the procurement department would translate into a considerable amount of profit. In essence, the Procurement Department has a mission to facilitate best practices and achieve economies of scale in the procurement of goods necessary for the effective and efficient operation of the company.

A core *procurement routine* can be generally illustrated in Fig. 3-4. It covers a series of interdependent actions, including initiating purchase request, generating purchase plan, selecting supplier candidates, enquiring quotations, selecting supplier and making procurement, collecting procurement products and invoices, and verifying invoices. The whole set of actions is repetitive, recognizable, and it involves multiple actors including staff from Procurement Department, Finance Department, and other business units, as well as all potential suppliers.

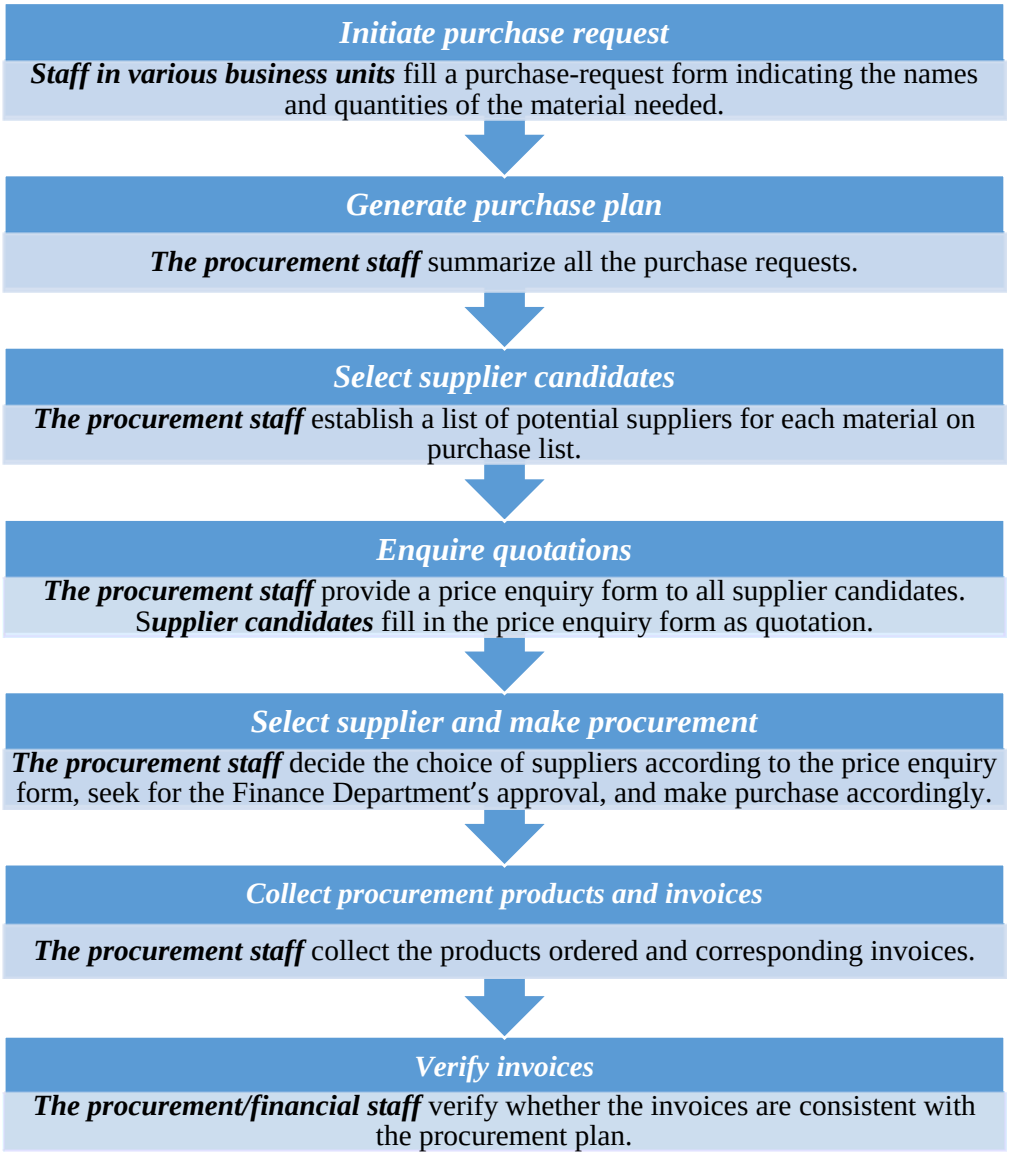


Figure 3-4 An Illustration of Actions in Procurement Routine

Before Informant #3's arrival, this *procurement routine* was performed as follows: Staff in various business units fill a purchase-request form indicating the names and quantities of the materials needed. The procurement staff summarize all the purchase requests and generate purchase plan. According to the items on the purchase plan, the procurement staff establish a list of potential suppliers for each material on the list. Next, the procurement staff provide a paper form of price enquiry to all supplier candidates. On the form, supplier candidates need to fill in the unit price of products in the form

as quotation. According to the price quotations of each supplier, the procurement staff choose the suppliers and make purchase from them. Then, the procurement staff collect products ordered and their invoices. Lastly, the procurement staff hand over the invoices to the Finance Department for invoice verification, and the financial staff verify the invoices according to the accounting routine.

When Informant #3 joined the Procurement Department, all the routines in the Procurement Department were unfamiliar to him. So he needed to learn how procurement department carries out its duty from basics. On one hand, he counted on the ERP system to grasp the most standard operations in the Procurement Department. On the other hand, he participated in the actual operations to strengthen the learning. It took him several months' extensive efforts to grasp the business practices in this new department. Soon after this warm-up period, Informant #3 started to demonstrate his value as a procurement manager with financial expertise.

Informant #3 noticed that, to fulfill the ultimate mission of the Procurement Department, which is to facilitate best practices and achieve economies of scale in the procurement of goods, the existing procurement routine was pursuing a goal to ***maximize the book value of the company***, in other words, to purchase the cheapest material according to the quoted prices and try to save every penny. However, from a financial expert's perspective, such an orientation may not lead to satisfactory outcome when being performed in the existing procurement routine. He asserted: "*From their perspective, the existing procurement staff depend on the market price to complete an order of procurement. In particular, how much does it cost to buy*

this product in the market? How much do others pay for the same product? … They make decisions according to these benchmarks... So the procurement staff simply gave me a list of quotes, such as 'Supplier A sells the product for RMB 3000 per unit, Supplier B sells the product for RMB 2000 per unit'. However, I think such a form of price enquiry is not informative at all… [*Even if the chosen supplier offers the cheapest price,*] *you don't know whether that is really the best one* [*via such method*]."

Informant #3's financial training and practices over the years strongly suggested that, the procurement activities should be oriented towards ***maximized financial value***, instead of the maximized book value of the current practices. Such an orientation change emerged from his deep belief in the benefits for an organization when carrying out the mission of a financial staff — to bring greater financial value to the organization. In particular, if the procurement routine became financial-value-driven, the procurement staff shall understand the cost structure of the suppliers and make decisions accordingly, so that they could reduce the procurement costs as well as purchase high-quality products. As Informant #3 explained: "*...to evaluate the financial value of certain materials, I as a financial expert need to know how much resources it takes to produce a product, how much would these resources cost, and what the profit rates of the suppliers are…* [*So that I can find out the best products with the most economic cost structure.*]"

Moreover, such a financial-value-driven orientation may benefit Wanhua if it engages with long-term strategic supplier partners offering cost advantages. Informant #3 asserted, "*By evaluating the financial value of suppliers' products, we can find a supplier providing the best quality at the*

lowest cost. Then we can have a long-term collaboration with this supplier." Hence, it is only when the target of procurement routine is the acquisition of the highest financial value that this routine really adds most value to the company.

Consequently, Informant #3 initiated a revolutionary change in the procurement routine, along with the ongoing ERP implementation in Wanhua. Instead of aiming at maximizing book value, all the procurement routines should be oriented towards financial value. Accordingly, a series of new procurement routines were introduced (see Table 3-2).

First of all, the whole procurement routine became highly digitalized in operation. The purchase requests turned to be raised up via ERP systems instead of paper forms. The purchase plan turned to be generated via ERP systems instead of manual work. The quotation enquiry form turned to be disseminated to supplier candidates digitally via ERP systems instead of paper forms, and the suppliers were forced to upgrade their IT systems for such digital communication.

Moreover, the orientation towards financial value maximization changed the way to select suppliers. Instead of simply asking the supplier candidates for a price quote regarding the products to purchase, the Procurement Department started to ask for the complete cost structure of the products for decision making. As Informant #3 described: "*I want the suppliers to report their cost-structures. For instance, how much steel did a manufacturer use to produce a certain machine? How many procedures did it take to produce that machine, and etc.? I redesigned the form for price*

enquiries, requiring our staff to figure out more details about our suppliers' quotes: i.e., the cost of the first business process, the cost of the second business process… until we arrived at the complete cost-structure. Eventually, with the cost-structure, and an expected profit rate from the suppliers, we obtained a final quote. This is how we are doing it now."

The change of procurement routine also in turn altered the routines in the Finance Department. On the one hand, the digitalized operation of procurement routine via ERP systems simplified the financial routine regarding the accounting of procurement activities. In particular, with the adoption of ERP systems, in the new procurement routines, procurement staff were required to verify the invoices by themselves, instead of handing over this task to the Finance Department. Hence, related financial routine were simplified. Just as Informant #6, who knew financial routines well, asserted: "*The invoice verification was originally the job of the Finance Department…but now* [*the revised procurement routine*] *helps the Finance Department complete this job… the financial staff no longer need to verify every single invoice, they only need to consolidate all the invoices verified.*" On the other hand, with the knowledge of cost structure of every product ordered, the procurement routine helps in collecting cost related data for further financial analysis. The Finance Department then started to develop more financial routines regarding value-added financial planning based on those information.

Table 3-2 An Overview of the Routine Reconfiguration of Procurement Routine

	Before	***After***
Trajectory Projection	To facilitate best practices and achieve economies of scale in the procurement of goods necessary for the effective and efficient operation of the company by maximizing the book value of the company.	To facilitate best practices and achieve economies of scale in the procurement of goods necessary for the effective and efficient operation of the company by maximizing the financial value of the company, and to optimize procurement practices via knowledge integration with other business functions and the usage of ERP.
Trajectory Scheme	1. ***Initiate purchase request:*** *Staff in various business units* fill a purchase-request form indicating the names and quantities of the material needed.	1. ***Initiate purchase request:*** *Staff in various business units* fill a purchase-request e-form indicating the names and quantities of the material needed via the ERP system.
	2. ***Generate purchase plan:*** *The procurement staff* summarize all the purchase requests.	2. ***Generate purchase plan:*** *The procurement staff* summarize all the purchase requests and generate procurement order in the ERP system.
	3. ***Select supplier candidates:*** *The procurement staff* establish a list of potential suppliers for each material on purchase list.	3. ***Select supplier candidates:*** *The procurement staff* establish a list of potential suppliers for each material to purchase.
	4. ***Enquire quotations:*** *The procurement staff* provide a paper form of price enquiry to all supplier candidates. *Supplier candidates* fill in the unit price of products in the form as quotation.	4. ***Enquire quotations:*** *The procurement staff* provide a (revised) e-form of price enquiry to all supplier candidates. *Supplier candidates* fill in the unit price of products and detailed cost structure in the product production as quotation**.**
	5. ***Select supplier and make procurement:*** *The procurement staff* decide the choice of suppliers according to the price quotations of each supplier, seek for *the Finance Department*'s approval, and make purchase accordingly.	5. ***Supplier selection and make procurement:*** *The procurement staff* decide the choice of suppliers according to the cost structure of each supplier, seek for *the Finance Department*'s approval via ERP systems, and make purchase accordingly.

	6. ***Collect procurement products and invoices:*** *The procurement staff* make sure the collection of procurement products and invoices.	6. ***Collect procurement products and invoices:*** *The procurement staff* make sure the collection of procurement products and invoices.
	7. Verify invoices: *The procurement staff* hand over the invoices to the Finance Department for invoice verification. *The financial staff* verify the invoices according to the accounting routine.	***7. Verify invoices:*** *The procurement staff* verify the invoices in ERP systems in accordance to the accounting standards.
Trajectory Action	(Take actions consistent with trajectory scheme.)	(Take actions consistent with trajectory scheme.)

Routine Reconfiguration Brought on by Enhanced Internal Collaboration

Wanhua's efforts to promote knowledge integration can be found not only in its distinct managerial-level internal job rotation policy, but also in its in-depth internal collaboration. In order to optimize the effect of ERP implementation, the top management of Wanhua pay particular attention to internal collaboration. In particular, when collaborating with other departments, staff from one department are encouraged to understand the procedures of departments they are involved with as if they were from that department. In many cases, such flexibility renders exchange of staff between departments possible. The experience of Informant #1 serves as a typical example of the effect of enhanced internal collaboration.

Informant #1 joined Wanhus's IT Department as a fresh graduate in Computer Science at the end of 2008. The IT Department had the mission to provide the high quality ICT-based services to facilitate internal and external users to work more efficiently and effectively, through providing effective technology support, promoting and facilitating the effective integration of technology and business practices. Accordingly, developing necessary IT components for the company was among the core of the business practices in the IT Department.

An *IT development routine* can be generally illustrated in Fig. 3-5. It covers a series of interdependent actions, including proposing IT demands, analyzing IT demands, developing IT modules, and implementing new/updated IT modules. The whole set of actions is repetitive, recognizable, and it involves multiple actors including staff from IT Department as well as other business units.

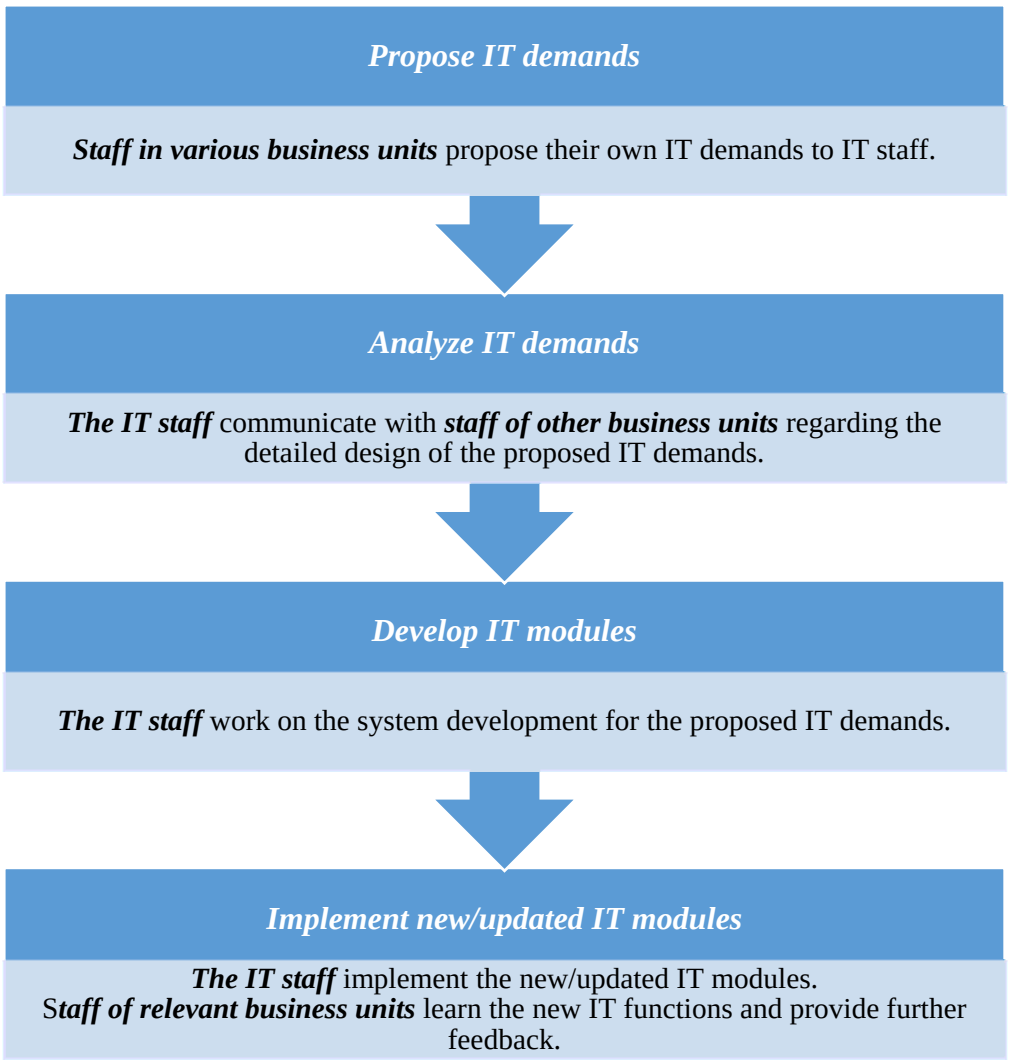


Figure 3-5 An Illustration of Actions in IT Development Routine

The staff in IT Department was separated into several groups to serve different business functions respectively. In Informant #1's work, he was assigned to serve the Finance Department, to response to the financial staff's need on information technology, and to help them better integrate their business practices with latest IT toolkit.

At the beginning of his work, Informant #1 followed the IT development routine to fulfill the various needs from the Finance Department.

Staff in various business units propose their own IT demands to IT staff. The IT staff then communicates with the staff who raise IT demands, regarding the detailed design of the proposed IT demands, to identify the functions to develop. After confirming the expectation, the IT staff work on the system development for the proposed IT demands. When the system development is done, the IT staff implement the new/updated IT modules, and let the related staff learn the new IT functions. These staff may also provide further feedback for further development.

While carrying out this routine, Informant #1 worked very closely with the financial staff, in accordance to the corporate policy on enhanced internal collaboration. Unlike the conventional IT staff, sitting in the computer center most of the time and communicating with system users via telephone calls, emails, and occasional meetings, Informant #1 almost set his desk at the Finance Department instead of the IT Department. He recalled: "*I worked very closely with the staff in the Finance Department. When our ERP system was implemented in 2008, I had been staying in the Finance Department all day for about one year. I sat in the office of Finance Department every day, together with financial staff …and communicated with and supported them whenever necessary, in order to improve the systems.*" The financial staff benefited greatly from such an arrangement, since they did not need to be concerned about any confusion regarding the financial IT systems during the ERP implementation progress.

Informant #1 did not simply act as an all-time stand-by technology support for the Finance Department. Rather, he acted as if he was an apprentice in the Finance Department, while on its part, the Finance

Department was completely open to his suggestions. Informant #1 observed all the business operations within the Finance Department on the spot, and gradually acquired the financial knowledge behind these operations through both self-learning and consulting financial staff. Moreover, thanks to the company's shared belief in team-spirit and open communication, he had all members of the financial staff as his teachers, as he recalled: "*During this process I learnt a lot* [*from the financial staff*]*… I literally communicated with all the staff in the Finance Department.*" Informant #1's acquisition of financial knowledge was so profound that, with continuing follow-up learning efforts, he was designated to the Finance Department as a manager several years later.

Along such interaction process, the adoption of ERP systems provided valuable foundation for Informant #1 to exchange information profoundly. Since the ERP system defined the scope and basic principles of the behavior in the Finance Department, the financial staff learnt from Informant #1 on the system adoption, meanwhile introduced their professional knowledge behind the design and adoption of the ERP system.

The close collaboration experience gradually brought adjustment to how the IT development routine was carried out (see Table 3-3). On the one hand, when analyzing IT demands proposed by financial staff, Informant #1 could make it in a more efficient manner because he became more acute regarding understanding and sensing system improvement opportunities available with the knowledge of routines in both finance and IT Departments. As he recalled: "*… In the past it might take me two to three days to understand what a user's need was exactly… Now, with some financial*

knowledge, I know exactly what the user wants, or I can even understand my users' needs before they raise the issue. This is a significant improvement on the efficiency and effectiveness of our job."

On the other hand, analyzing IT demands and proposing IT demands could be reversely carried out in the IT development routine. In particular, instead of receiving IT needs from financial staff and analyzing the needs accordingly, Informant #1 could directly propose potential IT improvement plan for the financial staff and seek for agreement. This was because his rich knowledge regarding the financial routines accumulated in close internal collaboration made him capable of generating valuable ideas on the integration of business operations through useful IT system design. He recalled: "*In the past I only noticed users' needs very fragmentally, and I knew that I needed to develop a system* [*incorporating various needs raised by users without further improvement*]. *But now, we can be very clear about what kind of financial tasks this system is aiming to solve, what the particular needs are, how to plan the financial IT system for the whole company, and how to design the system in order to satisfy these needs.*"

Even, within one year, Informant #1 could innovatively improve the financial routines by better planning and delivering related IT systems, as he recalled: "*With my financial knowledge, I can proactively provide our financial staff better* [*IT*] *working solutions.*" This action was deviant from the design of IT development routine. But it turned to be effective and efficient, and gradually appeared in the actual practice frequently, which made it later being routinized.

Take an example to illustrate this new practice. By proposing and developing a new IT component, Informant #1 helped in improving a financial routine of managing internally transferred *bank accepted bill* across subsidiaries (see Table 3-4). Here, bank accepted bill is a kind of negotiable instrument that guarantees payment from the bank in future transactions.

The *routine of managing bank accepted bill transfer across subsidiaries* can be generally illustrated in Fig. 3-6. Before Informant #1 introduced this IT initiative, the routine of managing bank accepted bill transfer across subsidiaries was as follows: The financial staff of the sender (subsidiary) search in the account of bank accepted bill in the IT system of this subsidiary, and record the transfer action for it. Then they deliver the bank accepted bill to the financial staff of the recipient (subsidiary). After receiving the bank accepted bill, the financial staff of the recipient (subsidiary) enter the details of the bank accepted bill manually to the account of bank accepted bill in the IT system of recipient (subsidiary).

With the financial knowledge accumulated during close collaboration, Informant #1 realized this issue, and believed that this issue could be technically solved. Therefore, he initiated a module in the Systems of Negotiable Instruments at subsidiary level to synchronize all the records of bank accepted bills across different subsidiaries. Thus, the financial staff of the recipient (subsidiary) no longer need to manually input the data again. Instead, they can reuse the information stored in the senders' IT systems. Now, they only need to confirm the information of the transferred bank accepted bill, which is sent from the IT system of the sender via this new IT component. As Informant #1 recalled: "*so we created a small tool in the system to avoid the*

repetitive manual inputting the same bank accepted bills, saving a lot of working load." Accordingly, the routine of managing bank accepted bill transfer across subsidiaries was simplified.

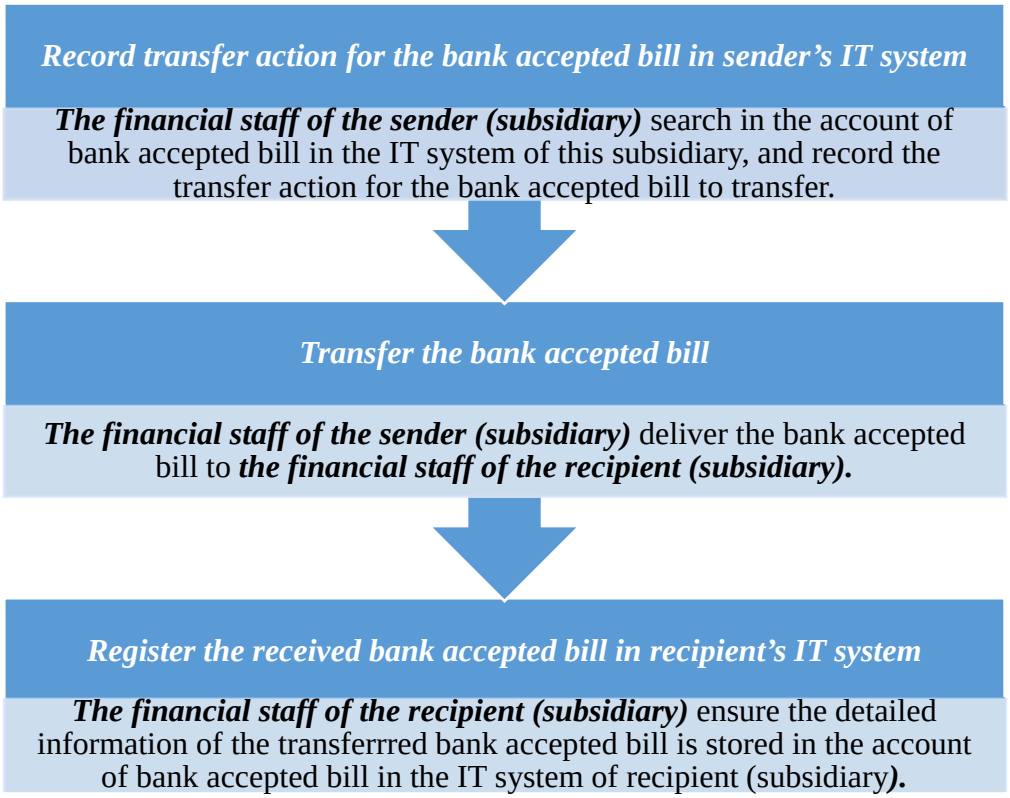


Figure 3-6 An Illustration of Actions in the Routine of Managing Bank Accepted Bill Transfer Across Subsidiaries

Table 3-3 An Overview of the Routine Reconfiguration of IT Development Routine

	Before	***After***	
Trajectory Projection	To provide the high quality ICT-based services to facilitate internal and external users work more efficiently and effectively, through providing effective technology support, promoting and facilitating the effective integration of technology and business practices.	To provide the high quality ICT-based services to facilitate internal and external users work more efficiently and effectively, through providing effective technology support, promoting and facilitating the effective integration of technology and business practices.	
Trajectory Scheme	1. ***Propose IT demands:*** *Staff in various business units* propose their own IT demands to IT staff.	1. ***Propose IT demands:*** *Staff in various business units* propose their own IT demands to IT staff.	1. ***Analyze IT demands:*** *The IT staff* constantly communicate with *staff of other business units* regarding how they carry out their routines in detail based on close collaboration.
	2. ***Analyze IT demands:*** *The IT staff* communicate with staff of other business units regarding the detailed design of the proposed IT demands.	2. ***Analyze IT demands:*** *The IT staff* communicate with staff of other business units regarding the detailed design of the proposed IT demands more efficiently, based on close collaboration.	2. ***Propose IT demands:*** *The IT staff* propose IT solutions for other business units and seek for agreement.
	3. ***Develop IT modules:*** *The IT staff* work on the system development for the proposed IT demands.	3. ***Develop IT modules:*** *The IT staff* work on the system development for the proposed IT demands.	

	4. ***Implement new/updated IT modules:*** *The IT staff* implement the new/updated IT modules. *Staff of relevant business* units learn the new IT functions and provide further feedbacks.	4. ***Implement new/updated IT modules:*** *The IT staff* implement the new/updated IT modules. *Staff of relevant business units* learn the new IT functions and provide further feedbacks.
Trajectory Action	1. The proposal of IT demands always came from business units. (Take actions consistent with trajectory scheme.)	1. The proposal of IT demands was occasionally developed by the IT staff for the finance staff proactively, and this new practice gradually turned to be routinized. (For the rest actions, generally take actions consistent with trajectory scheme.)

Table 3-4 An Overview of the Routine Reconfiguration of the Routine of Managing Bank Accepted Bill Transferred Across Subsidiaries

	Before	***After***
Trajectory Projection	To record every internally transferred bank accepted bill correctly in the IT system of the recipient.	To record every internally transferred bank accepted bill correctly in the IT system of the recipient.
Trajectory Scheme	1. ***Record transfer action for the bank accepted bill in sender's IT system:*** *The financial staff of the sender* (*subsidiary*) search in the account of bank accepted bill in the IT system of this subsidiary, and record the transfer action for the bank accepted bill to transfer. 2. ***Transfer the bank accepted bill:*** *The financial staff of the sender* (*subsidiary*) deliver the bank accepted bill to *the financial staff of the recipient* (*subsidiary*). 3. ***Register the received bank accepted bill in recipient's IT system:*** *The financial staff of the recipient* (*subsidiary*) enter the details of the bank accepted bill manually to the account of bank accepted bill in the IT system of recipient (subsidiary).	1. ***Record transfer action for the bank accepted bill in sender's IT system:*** *The financial staff of the sender* (*subsidiary*) search in the account of bank accepted bill in the IT system of this subsidiary, and record the transfer action for the bank accepted bill to transfer. 2. ***Transfer the bank accepted bill:*** *The financial staff of the sender* (*subsidiary*) deliver the bank accepted bill to *the financial staff of the recipient* (*subsidiary*). 3. ***Register the received bank accepted bill in recipient's IT system:*** *The financial staff of the recipient* (*subsidiary*) confirm the information of the transferred bank accepted bill, which is sent from the IT system of the sender via the new IT component.
Trajectory Action	(Take actions consistent with trajectory scheme.)	(Take actions consistent with trajectory scheme.)

Routine Reconfiguration Brought on by Comprehensive Cross-Specialization Training Policies

In addition to internal job rotation and internal collaboration, Wanhua's efforts on knowledge integration can be also found in its distinct comprehensive cross-specialization training policies: the company tends to provide specialist training to employees on a very broad scale. Wanhua does not only offer internal training, such as IT training for staff from diverse backgrounds, but also offer external training. For instance, before the commencement of its ERP implementation, the company first invited 13 staff to attend the official SAP certification course for training SAP experts. Among these attendees, only half were selected from the IT Department, while the rest were from other departments, such as the Finance Department, Production Department, etc.

Another example of such training was the sending of employees to pursue a Master degree in Accounting. In 2010, Wanhua sent about 45 employees to enroll in a part-time Master of Professional Accounting (MPAcc) Program that lasted 2 to 3 years. It is not surprising for financial staff with relevant backgrounds to pursue a Master degree in Accounting. Yet, about 80% of the attendants had no prior accounting knowledge and came from the Marketing Department, Procurement Department, IT Department.

Informant #4 was a graduate of this MPAcc Program. She was in charge of logistics work for the international orders under the Marketing Department. Her main routine was the product exportation routine, with the mission to provide sound service to customers in foreign countries after order

is placed, and secure the financial transactions for the company during this process.

A *product exportation routine* can be generally illustrated in Fig. 3-7. It covers a series of interdependent actions, including receiving foreign orders, preparing ordered goods, preparing shipping, confirming payment, dispatching foreign orders, and collecting payment. The whole set of actions is repetitive, recognizable, and it involves multiple actors including the sales staff and logistics staff from the Marketing Department, the staff from the Production Department, the staff from the Finance Department, the customers, and staff in various service providers (e.g., Custom, shipping company, etc.).

Before the ERP implementation, this routine was generally performed as follows: The sales staff receive order from foreign clients and inform relevant departments, including the Marketing Department. The logistics staff from the Marketing Department first inform the Production Department to prepare the ordered goods. Then the logistics staff book the cargo space for the orders in accordance to the production time needed, and make detailed declaration to Custom for exportation. Meanwhile, they wait for the customers to send them a proof of payment called Letter of Credit (L/C), which is a document issued by a bank to guarantee the payment from the client to Wanhua, provided certain documents have been presented to the bank. After receiving the approval from the Custom and the confirmation of the payment from the clients, the logistics staff will arrange for the required number of dispatch vehicles to dispatch the goods from the warehouse to the cargo ship in order to complete the delivery of the goods. The logistics staff then send shipping invoice to the client for reference. With all the required documents

presented, including Letter of Credit (L/C) and the shipping invoice, the logistics staff would collect the payment from the bank. Finally, the logistics staff will present the required documents, including the shipping invoice, to the bank for payment collection, then report to the financial staff accordingly. It usually takes about a month to complete the whole routine.

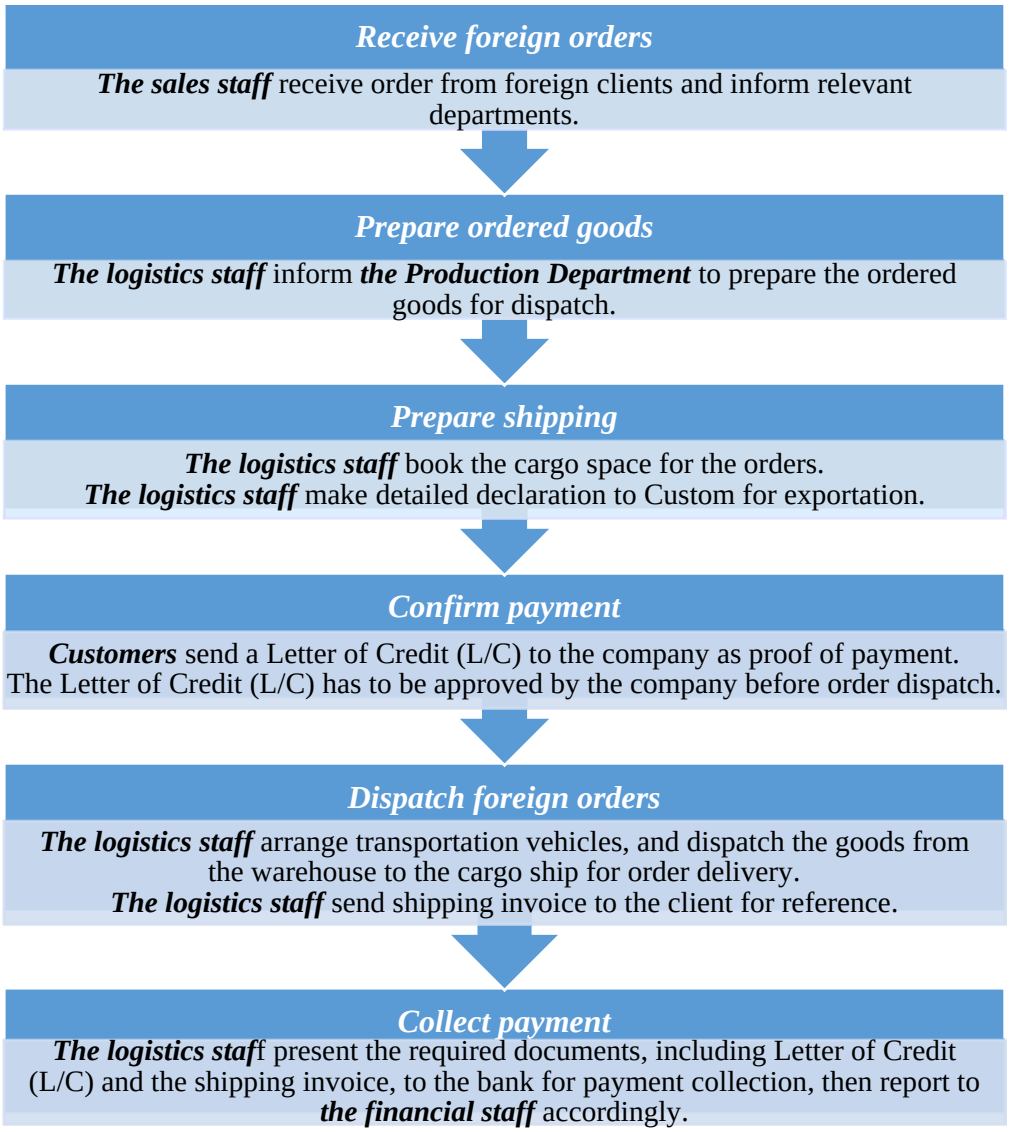


Figure 3-7 A Brief Illustration of Product Exportation Routine

The implementation of Wanhua's ERP in 2008 brought changes to this routine (see Table 3-5). Some of the changes concerned only the alteration of tools to complete the routine. For instance, all the activities were recorded and managed via ERP instead of being recorded on paper, and much of the internal communication was conducted via the ERP system virtually instead of via face-to-face communication. Some changes were more complicated. For instance, in terms of confirming the payment from the client, previously, the logistics staff only needed to confirm the payment on receipt of the Letter of Credit independently, and then dispatch the goods directly. But under the ERP system, the logistics staff needed to send the Letter of Credit to the Finance Department. It was only after receiving the approval from the Finance Department that they could dispatch the goods.

Such a task dependence between the financial staff approving the Letter of Credit according to financial routines and the dispatch of foreign orders to perform product exportation routine made the two routines interconnected with each other. The usage of ERP system enforced these changes, since the marketing staff could not bypass the financial staff to proceed as they wished.

Yet, the two routines were not automatically coordinated well. For Informant #4, a senior staff member who was used to the prior product export routines well, the change in dealing with the Letter of Credit actually bothered her considerably. While sometimes she could get permission from the Finance Department to dispatch the orders on time, in many cases she could not achieve so when realizing the need of one more permission at the last moment. She recalled: "*In the past we just do it manually* [*without tight constraints*]*, but*

now, [*because of the ERP,*] *we could not dispatch the products if* [*related procedures haven't been went through in ERP systems*]." *Although she had to follow the new design routine because of the constraint of ERP systems, she was very reluctant, as she recalled:* "*We felt this* (*bringing the Letter of Credit to the Finance Department for approval*) *was merely a new trouble* [*caused by the Financial Department*]*, and increased our work load meaninglessly*."

Without good understanding on the necessity to perform the revised product exportation routine and sufficient communication with the financial staff, the actual performance of product exportation routine often turned to be inefficient, as Informant #4 described: "*For instance, I want to dispatch an order TODAY. However, I just realized that I have to find the financial staff to approve* [*the Letter of Credit*] *or complete other procedures before dispatch. And the financial staff may not be available to get my request done today. That would make things headache*."

Informant #4's attitude towards such change gradually shifted after she had enrolled the MPAcc Program. By acquiring sufficient knowledge on related financial routines, Informant #4 learnt a new perspective for understanding what she was expected to do in the product exportation routine, i.e., the financial staff wanted to verify the Letter of Credit carefully, so that the payment was secured. She commented: "*After acquiring accounting knowledge, you know this* (*bringing the Letter of Credit to the Finance Department for approval*) *is designed for risk control. We can better understand why our financial staff ask for such actions* (*and better adhere accordingly*)."

Such improved understanding also led to better performance, as Informant #4 recalled: "*A better understanding of finance and accounting helps me in my work. I can better understand the policies and actions required by the Finance Department… So that our communication with the Finance Department becomes smoother* [*and our respond to them is better*], *especially in terms of risk management, internal control…*"

Table 3-5 An Overview of the Routine Reconfiguration of Product Exportation Routine

	Before	***After***
Trajectory Projection	To provide sound service to customers in foreign countries after order is placed, and secure the financial transactions for the company during this process.	To provide sound service to customers in foreign countries after order is placed, and secure the financial transactions for the company during this process.
Trajectory Scheme	1. ***Receive foreign orders:*** *The sales staff* receive order from foreign clients and inform relevant departments.	1. ***Receive foreign orders:*** *The sales staff* receive order from foreign clients and inform relevant departments via ERP systems.
	2. ***Prepare ordered goods:*** *The logistics staff* inform the Production Department to prepare the ordered goods.	2. ***Prepare ordered goods:*** *The logistics staff* inform the Production Department to prepare the ordered goods via ERP systems.
	3. ***Prepare shipping:*** *The logistics staff* book the cargo space for the orders in accordance to the production time needed. The logistics staff make detailed declaration to Custom for exportation.	3. ***Prepare shipping:*** *The logistics staff* book the cargo space for the orders in accordance to the production time needed. The logistics staff make detailed declaration to Custom for exportation.
	4. ***Confirm payment:*** *Customers* send a Letter of Credit (L/C) to the *logistics staff* as proof of payment. *The logistics staff* approve the arrival of Letter of Credit (L/C).	4. ***Confirm payment:*** *Customers* send a Letter of Credit (L/C) to the *logistics staff* as proof of payment. *The logistics staff* send the Letter of Credit (L/C) to the Finance Department. *The financial staff* approve the arrival of Letter of Credit (L/C) via ERP systems.

	5. ***Dispatch foreign orders:*** The logistics staff arrange transportation vehicles, and dispatch the goods from the warehouse to the cargo ship for order delivery. The logistics staff send shipping invoice to the client for reference.	5. ***Dispatch foreign orders:*** The logistics staff arrange transportation vehicles, and dispatch the goods from the warehouse to the cargo ship for order delivery. The logistics staff send shipping invoice to the client for reference.	
	6. ***Collect payment:*** The logistics staff present the required documents, including Letter of Credit (L/C) and the shipping invoice, to the bank for payment collection, then report to the financial staff accordingly.	6. ***Collect payment:*** The logistics staff present the required documents, including Letter of Credit (L/C) and the shipping invoice, to the bank for payment collection, then report to the financial staff accordingly.	
Trajectory Action	(Take actions consistent with trajectory scheme.)	…… 4. Confirm payment Before Informant #4 enrolled in the Master degree program in Accounting, she often halted when collaborating with the financial staff, which made the performance of the routine inefficiently. …… (Take most actions consistent with trajectory scheme.)	…… 4. Confirm payment After Informant #4 enrolled in the Master degree program in Accounting, her knowledge on accounting enables her to improvise in different situations to collaborate with the financial staff and perform the routine efficiently. …… (Take most actions consistent with trajectory scheme.)

3.2.5 Discussion

As mentioned previously, I adopted the conceptualization of "routine as trajectory" as my theoretical lens to examine Wanhua's reconfiguration of interconnected routines. In this way, my data analysis shows that the reconfiguration of interconnected routines can be achieved through the process of the ***cross-fertilization of business domain knowledge***. In particular, the reconfiguration of interconnected routines can be classified into three approaches to reconfigure trajectory elements. In this section, I will first discuss cross-fertilization of business domain knowledge as a method for reconfiguration of interconnected routines, and then discuss three approaches of cross-fertilization of business domain knowledge identified from my case analysis.

3.2.5.1 Cross-Fertilization of Business Domain Knowledge for Reconfiguration of Interconnected Routines

Cross-fertilization of business domain knowledge refers to mutual knowledge exchange among different business functions that enhances understanding or proves beneficial. Here, business domain knowledge includes an individual's knowledge of facts, circumstances, and issues surrounding a given business area (Amabile 1996), which is necessary for an individual to figure out feasible solutions to a given problem. An organizational routine, which captures rich procedural knowledge of an organization in particular areas, is essentially a set of executable business domain knowledge (Nelson and Winter 1982; Teece and Pisano 1994; Teece *et al.* 1997). In Wanhua's case, the internal job rotation from the Finance

Department to the Procurement Department, the in-depth learning of financial knowledge for technical staff, and the close collaboration among different departments, which all involves knowledge exchange across different organizational routines, can be viewed as the cross-fertilization of business domain knowledge.

Our case analysis reveals that cross-fertilization of business domain knowledge enables an organization to achieve reconfiguration of interconnected routines. This is because cross-fertilization of business domain knowledge serves as a major source of creative organizational performance to generate new solutions for existing routines.

Reconfiguration of interconnected routines is essentially concerned with updating organizational knowledge on solving a series of interconnected tasks, because organizational routines capture the knowledge on how organizations complete much of what they do (Becker *et al.* 2006; Obstfeld 2012). This does not only concern improving every single routine respectively, but is also about achieving concurrence of effort across these routines towards the same goal (Rockart and Short 1989). Hence, such a knowledge updating process largely involves efforts to coordinate these interconnected tasks, which are often very challenging since the organization usually lacks available solutions to improve existing practices (Kenen 1995; Rockart and Short 1989; Thompson 1962). Therefore, in order to reconfigure interconnected routines, organizations need creativity to generate new solutions for interconnected routines.

The reconfiguration of interconnected routines and the cross-fertilization of knowledge serves as a major source of creativity for an organization. Cross-fertilization of knowledge is generally considered as a way of increasing creative performance (Amabile 1996; Perry-Smith and Shalley 2003). Related examples abound. For instance, in academic research, bioinformatics is an emerging research area that enables better understanding of biology using knowledge from many areas, such as computer science, statistics, mathematics and engineering. As in the business world, leading automobile companies integrate smart phone technologies into their traditional products to revolutionize their product experience.

In my research context, cross-fertilization of business domain knowledge can boost the creative performance in an organization, leading to a series of routine reconfigurations. Since staff working on different routines have their own expertise, they usually have their own knowledge bodies that are relatively stable and distinct. Cross-fertilization of business domain knowledge is about knowledge exchange between different knowledge bodies, which are inherent in different routines. Accordingly, cross-fertilization of business domain knowledge can increase individuals' understanding about their own routines via understanding of their work from collaborator's perspective, leading to improved ability in individuals to generate and validate potential solutions (Campbell 1960; Mumford and Gustafso 1988; Simonton 1999). For instance, as described in Section 3.2.4.2, after learning financial knowledge from the financial staff, Wanhua' IT staff could provide new solutions on the routine of managing bank accepted bill transfer across subsidiaries by initiate a new IT component for the IT systems. Some

empirical studies also support such an effect. For instance, Andrews and Smith (1996) found that product managers with more knowledge about the marketing environment created more creative marketing programs.

Moreover, such knowledge exchange between different routines enhances an individual's exposure to different and unusual ideas from other business domains (Amabile 1996; Andrews 1979; Perry-Smith and Shalley 2003; Woodman *et al.* 1993), thus increasing an individual's ability to generate unusual solutions. For instance, when applying financial knowledge to analyze procurement routine, Informant #3 developed an innovative approach to evaluate procurement tasks and performance, which revolutionized the procurement routine. Empirical studies also provide related support. Monge *et al.* (1992) found that more group communication can promote the generation of innovative ideas.

To further enhance our understanding of the process of the cross-fertilization of business domain knowledge and the roles of ES in such a process, I investigate three approaches of cross-fertilization from a trajectory perspective in the subsequent sections.

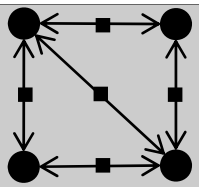
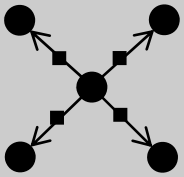
3.2.5.2 Three Approaches of Cross-Fertilization of Business Domain Knowledge

As mentioned previously, I adopted the conceptualization of "routine as trajectory" (Strauss 1993) as my theoretical lens to examine Wanhua's reconfiguration of interconnected routines. In adopting this theoretical lens, the reconfiguration of interconnected routines can be categorized into three types, namely, the reconfiguration of trajectory projection, the reconfiguration

of trajectory scheme, and the reconfiguration of trajectory action. Accordingly, I argue that ***the reconfiguration of interconnected routines takes place at three different levels: strategic, tactical, and operational***. In particular, the reconfiguration of trajectory projections is a strategic level reconfiguration, which involves refining and coordinating the goals of interconnected routines towards the same organizational goal. The reconfiguration of trajectory schemes is a tactical level reconfiguration, which involves regenerating a detailed plan on how to perform interconnected routines smoothly, while the reconfiguration of trajectory actions is an operational level reconfiguration, which involves adjusting the actual performance of interconnected routines effectively and efficiently.

According to emergent data, it is readily apparent that Wanhua adopted three approaches of cross-fertilization of business domain knowledge, which directly led to the reconfiguration of trajectory projections, trajectory schemes, and trajectory actions, respectively (see Table 3-6 for summary). In all these approaches, ES provides space to conduct cross-fertilization of business domain knowledge. In particular, ES serves as three types of spaces, for three approaches of cross-fertilization respectively. In each approach, based on the space provided by ES, Wanhua adopted one configuration of cross-fertilization, and arranged key actors as pollinators to enact the knowledge transfer in the process of cross-fertilization, leading to implications regarding the trajectory reconfiguration. I will next present these approaches individually.

Table 3-6 Summary of Three Approaches of Cross-Fertilization of Business Domain Knowledge

Approach	***Strategic level***	***Tactical level***	***Operational level***
ES as Space	Educational space	Communication space	Regulating space
Cross-Fertilization Configuration	 Point-to-Point Construction	 Mesh network	 Radial network
Role of Pollinators	Selected managers as knowledge combinators	Involved staff as knowledge ambassadors	Selected trainers as knowledge distributors
Implication	Synergy of trajectory projections across interconnected routines	Conjunction of trajectory schemes across interconnected routines	Conformity of trajectory actions across interconnected routines

Legend: ● Organizational routine ■ Pollinators

⟶ Direction of knowledge transfer

3.2.5.3 Cross-Fertilization at the Strategic Level

ES as Space: Educational Space

Organization needs a context for knowledge creation to take place (Nonaka and Konno 1998). Such context, which is labeled as ‘space’ in prior literature, is also necessary for the reconfiguration of interconnected routines, given routine reconfiguration is essentially about creating new knowledge for the focal organization in the form of routines (March and Simon 1958 [1993]).

In the process of cross-fertilization, enterprise systems (ES) first serves as an educational space for knowledge sharing that cultivates follow-up routine reconfigurations. ES is typically adopted in modern organizations

throughout their operations, and usually deeply embedded in the operation of organizational routines by recording information generated in performing routine and ensuring the fulfillment of key steps of organizational routines as designed. Hence, ES is a critical infrastructure to stores rich information and explicit knowledge throughout the organization, and captures much knowledge embodied by organizational routines. This made ES a systematic knowledge sharing space. Anyone who is new to a particular business function could get familiar with the organizational routines within such business function in an accurate, comprehensive, and efficient manner, by looking into the procedures required by the ES. Take Informant #3's experience for instance, the ES helped him a lot in quickly grasping precise knowledge of procurement department after he was transferred from Finance Department to Procurement Department, which served as a critical premise to improve the routines of procurement department later on.

Cross-Fertilization Configuration: Point-to-Point Construction

Organizational routines can be considered as the knowledge blocks of an organization, which incorporates both the knowledge regarding cognition (i.e., trajectory projection and trajectory scheme) and behavior (i.e., trajectory action) (Feldman and Pentland 2003; March and Simon 1958 [1993]; Obstfeld 2012). Accordingly, routine reconfiguration is essentially about creating and maintaining new knowledge for an organization in the form of organizational routines. In order to do so via cross-fertilization, based on the educational space provided by ES, the company first needs to design a cross-fertilization configuration. I define ***cross-fertilization configuration*** as the plan of how knowledge transfer can take place among different routines, in

order to bring about beneficial outcomes. Central in such a configuration are the patterns of knowledge transfer among different knowledge blocks embodied by different routines.

I term the cross-fertilization configuration of this strategic level approach as ***point-to-point construction***. Table 3-6 shows an illustration of the pattern of point-to-point construction. In such a configuration, two knowledge blocks embodied by two different routines are designed to be directly connected. In addition, the knowledge transfer under such a configuration is typically unidirectional, from one routine to another. An organization may select multiple pairs of organizational routines for point-to-point construction.

Within such configurations, the cross-fertilization benefits the organization when one routine incorporates the knowledge of the other routine and develops innovative enhancement corresponding to the focal routine. During Wanhua's ERP implementation, the internal job rotation of managers from different departments formed several pairs of point-to-point construction for cross-fertilization. For instance, knowledge in financial routines was transferred to the Procurement Department via the job rotation of Informant #3, who was previously a manager of the Finance Department. Another example is that knowledge in production routines was transferred to the Marketing Department by the job rotation of a previous manager of the Production Department.

Role of Pollinators: Selected Managers as Knowledge Combinators

In addition to cross-fertilization configuration, individuals also play important roles in achieving cross-fertilization of business domain knowledge,

since they may serve as agents to transfer crucial knowledge from one routine to another (Hargadon 2003; Pawlowski and Robey 2004). I name such agents as ***pollinators*** in the process of the cross-fertilization of business domain knowledge. In different approaches of cross-fertilization, different actors act as pollinators and perform various roles. According to my case analysis, under the point-to-point construction, the pollinators are ***selected managers***, and they perform ***as knowledge combinators*** in the process of cross-fertilization.

Managers play important roles in the knowledge transfer across departments with different knowledge bodies (Wiesenfeld and Hewlin 2003). A manager is typically well aware of the goals of his/her department, and has sufficient knowledge about the existing practices to enact the goals. Hence, he/she typically masters the trajectory projections of the routines within his/her department, and have a certain level of understanding about the corresponding trajectory schemes of these routines. Based on such nice understanding about the routines in a manager's departments, additional knowledge on the trajectory projections and trajectory schemes of interrelated routines in other departments may provide the manager a refreshing perspective to examine existing trajectory projections and trajectory schemes, so that they can contemplate on how to further improve existing routine designs, as well as the coordination among interconnected routines (Wiesenfeld and Hewlin 2003). Therefore, managers with cross-functional knowledge on routines from different departments may serve as agents of knowledge transfer.

In Wanhua's case, the company initiated internal job rotation policy in response to the need of knowledge integration during ERP implementation.

Capable managers (such as Informant #3), who had sufficient knowledge regarding the trajectory projection and trajectory scheme of their own routines, were selected to rotate to another department as managers regularly. While they specialized in their previous routines, these selected managers were expected to grasp the trajectory projection and trajectory scheme of the new routines as soon as possible. By going through the internal job rotation, these selected managers became knowledgeable on the trajectory projections and trajectory schemes of both their prior and current routines, just like Informant #3 who knew routines of both the Finance Department and the Procurement Department clearly. In fact, they were expected to make full use of their accumulated knowledge on both routines to work creatively in their new positions.

In addition, managers need to have sufficient legitimacy to initiate routine reconfigurations within their departments, which further renders the knowledge creation possible (Wiesenfeld and Hewlin 2003). The designation of managers endows them with the authority to refine the designs of their routines, i.e., trajectory projections and trajectory schemes, on behalf of their departments in order to practically obtain synergies between different departments. As pollinators, the legitimacy of managers is particularly necessary for the changes in trajectory projections, which are strategic level decisions. This can also be suggested in Wanhua's case, as the changes of the trajectory projection in the Procurement Department were initiated and could only be initiated by the manager of this department. Those changes were indeed of strategic importance.

Hence, as pollinators, selected managers can generate new knowledge based on the assimilated knowledge in routines of the different departments, and eventually refine the designs of routines. I name such pollinators as knowledge combinators.

Implications of Cross-Fertilization: Synergy of Trajectory Projections across Interconnected Routines

Within an organization, interconnected routines are expected to achieve a unified organizational goal. However, in practice, the goals of different routines, in other words, the trajectory projections of different routines will usually more or less diverge from each other. This is mainly because actors from different routines tend to have different knowledge bodies and limited scope of ideas within their business domains, leading to the difficulties in local optimization (Perry-Smith and Shalley 2003).

Based on ES as an educational space, a point-to-point construction as cross-fertilization configuration and selected managers as knowledge combinators, an organization is enabled to revise existing routine designs based on sufficient considerations about the collaboration of different routines. The point-to-point construction of cross-fertilization configuration ensures the pollinators under such configuration to develop profound business domain knowledge across different departments and different routines, which is a premise for further knowledge integration.

Meanwhile, selected managers as knowledge combinators strongly facilitate the changes of trajectory projection, in other words, routine reconfiguration at the strategic level. On the one hand, given the

administrative roles of the managers, their knowledge regarding both prior departments and current departments are relatively profound to a strategic level, instead of simply about operational details. On the other hand, these managers are equipped with sufficient legitimacy to implement new ideas drawn from the knowledge integration, especially the changes of trajectory projection. The change of trajectory projection further invokes a series of changes on trajectory schemes and trajectory actions, yet, the revision of trajectory projection is more significant and fundamental (Chen *et al.* 2014; Feldman and Pentland 2003). Therefore, I identify the key implication of this strategic level approach as the synergy of trajectory projections across interconnected routines.

In Wanhua's case, the revolutionary reconfiguration of procurement routine began from the revision of its trajectory projection, which is from book-value maximization to financial-value maximization via knowledge integration and the usage of ERP. This led on to various corresponding changes on its trajectory schemes, for instance, a financial-value oriented form for suppliers to fill when enquiring quotations, as well as a more integrative usage of ERP system especially when generating purchase plan, enquiring quotations, and verifying procurement invoices.

A summary of this approach is presented below (see Table 3-7).

Table 3-7 Summary of Strategic Level Approach of Cross-Fertilization

Strategic Level Approach		***Evidence From The Case***
ES as Space	Educational Space	■ ES enabled new procurement manager to grasp procurement routines precisely and rapidly. ■ ES enabled new production manager to grasp production routines.
Cross-Fertilization Configuration	Point-to-Point Network	■ Manager's job rotation from Finance Department to Procurement Department during ERP implementation. ■ Manager's rotation from IT Department to Production Department during ERP implementation.
Role of Pollinators	Selected Managers as Knowledge Combinators	■ After job rotation, the new procurement manager assimilated financial routines with procurement knowledge. ■ After job rotation, the new manager in Production Department assimilated IT knowledge with production knowledge.
Implications of Cross-Fertilization	Synergy of trajectory projections across interconnected routines	■ The goal of procurement routine changed from book-value maximization to financial-value maximization with in-depth usage of ERP by reference to the goals of finance routines. ■ The goal of the production routine was enriched by adding data-driven production, which originated from the routines of the IT Department.

3.2.5.4 Cross-Fertilization at the Tactical Level

ES as Space: Communication Space

Since ES is a critical infrastructure that stores explicit organizational knowledge and involves in a wide range of organizational behaviors, ES laid an important common ground for actors with different backgrounds and specialties in different departments to collaborate together and fulfill organizational tasks. Because of ES, these actors share a mutual toolkit to enact and revise their existing organizational routines. Hence, ES serves as a communication space that cultivates more creative solutions for organizational tasks since the common ground reduced the barrier to establish cross-functional understanding and collaboration. In Wanhua's case, because of the company's ES, the staff of Production Department can communicate with other staff easily when developing enhanced routine design, especially the trajectory scheme of the existing routine.

Cross-Fertilization Configuration: Mesh Network

I term the cross-fertilization configuration of this approach as a ***mesh network***. Table 3-6 shows an illustration of the pattern of mesh network. This kind of cross-fertilization configuration comprises multiple knowledge blocks embodied by different routines in a mesh topology, in which knowledge transfer takes place among these knowledge blocks. The knowledge transfer under such a configuration is bidirectional or even multilateral. In particular, in this network, any knowledge block embodied in it routine can share and receive relevant knowledge from other knowledge blocks. A mesh network is formed by the business units involved in either regular or temporary internal collaboration.

With such a network, the cross-fertilization benefits the organization when one or multiple routines incorporate knowledge acquired from other routines, and generate revised routine designs accordingly. In Wanhua's case, the close internal collaboration among different departments established a mesh network. For instance, Informant #1, as an IT staff member, worked closely with staff in the Finance Department, thus established a mesh network for IT staff and financial staff exchanging knowledge of their own routines. Similarly, staff in the Production Department worked closely with IT staff, so that the IT staff and production staff acquired useful knowledge from each other.

Role of Pollinators: Involved Staff as Knowledge Ambassadors

Organizational routines not only instruct the proper behavior of actors regarding how to carry out themselves when performing the routines, but also provide knowledge of the expected behavior of other actors (Nelson and Winter 1982; Simon 1947/1997; Stene 1940). In particular, organizational routines serve as templates for achieving organizational goals, which further equip actors with a sense of appropriateness to ask other actors to account for certain actions in the routines (Feldman and Pentland 2003). Such detailed knowledge on how each actor of a routine shall behave constitutes an actor's rich and comprehensive understanding of his/her routine, especially regarding the trajectory scheme of the routine (Strauss 1993). Accordingly, staff involved in one routine can be potential pollinators in the cross-fertilization.

When staff are enabled to communicate in-depth with each other regarding their routines, they could prove very informative for other staff who know little about their routines previously. Such interpersonal communication

is not unidirectional but bilateral or even multilateral. Staff from different routines can exchange their knowledge and questions, go through each other's trajectory schemes, acquire rich inspiring ideas on the improvement of trajectory schemes, and negotiate on the details of the revisions of existing trajectory schemes, based on the specialties and interests of different parties. Hence, with this approach, all staff involved in performing these interconnected routines can actually be pollinators, and perform as ***knowledge ambassadors*** in the process of cross-fertilization.

In Wanhua's case, Informant #1 as an IT staff exchanged knowledge with financial staff regularly and profoundly. Informant #1 shared his knowledge regarding IT-related routines and ERP systems with the financial staff. Meanwhile, the financial staff shared knowledge on the financial routines with Informant #1. As a result, the financial staff acquired sufficient IT knowledge for ERP implementation, while Informant #1 acquired a lot financial knowledge, especially the trajectory schemes of financial routines. With such a mutual understanding with each other, both sides discussed possible improvements in their own trajectory scheme frequently, towards a mutually agreeable plan on the reconfiguration of existing trajectory schemes. For instance, Informant #1 proposed a new IT components to improve the efficiency of the financial routine of managing bank accepted bill transferred across subsidiaries.

Implications of Cross-Fertilization: Conjunction of Trajectory Schemes across Interconnected Routines

While the trajectory schemes of interconnected routines are usually designed to be logically connected, these trajectory schemes may be far from

perfect. These trajectory schemes may evolve from the old approaches without thorough and regular reexamination on whether such interconnectedness is an optimal approach in the current context. On the one hand, the development of an IT infrastructure can result in new possibilities in the solution of existing problems. On the other hand, the changes of previous trajectory schemes, which involve adding, revising, and deleting of certain actions from the previous trajectory schemes, may also shed light on new solutions.

Based on ES as a communication space, mesh network as cross-fertilization configuration and involved staff as knowledge ambassadors, an organization is enabled to revise existing trajectory schemes across interconnected routines. The mash network of cross-fertilization configuration ensures the pollinators under such configuration have a bilateral or even multilateral communication among each other, which serves as a knowledge foundation for the further coordination among the trajectory schemes of interconnected routines. It significantly cultivates the conversation among actors of different yet interconnected routines.

Under such cross-fertilization configuration, involved staff as knowledge ambassadors facilitate the changes of trajectory schemes, in other words, routine reconfiguration at tactical level. In particular, through close interaction and collaboration in the performance of interconnected routines over time, staff involved in different routines can educate each other with their in-depth understanding about their routines, especially their trajectory schemes. A mutual understanding on these interconnected routines enables these staff to reflect on their existing trajectory schemes based on a broader picture of the organizational operation. They can identify existing issues, come up with new

solutions, and negotiate on the necessity and feasibility to modify these trajectory schemes. In doing so, the trajectory schemes of interconnected routines are better planned to be more efficient and effective, and better coordinated with each other. Since the trajectory schemes are about the designs on how to perform the routines towards their expected goals respectively, the changes of trajectory schemes are significant routine reconfiguration at a tactical level. Therefore, I identify the key implications of this tactical level approach as the conjunction of trajectory schemes across interconnected routines.

In Wanhua's case, under the close collaboration between the IT departments and the Finance Department, Informant #1 as an IT staff exchanged knowledge with financial staff regularly and profoundly, leading to cross-functional discussions regarding possible improvements in their own trajectory scheme frequently. As a result, the way Informant #1 carried out the IT development routine was changed by proactively proposing potential IT solutions for the financial staff for further discussion, instead of always waiting for financial staff to propose their own IT needs, to better customize for the need of the financial routines. The financial routines benefited from such change that, one of the financial routines for managing bank accepted bill transferred across subsidiaries was altered via the introduction of a new IT component proactively proposed by Informant #1 under the new trajectory scheme of IT development routine.

A summary of this approach is presented below (see Table 3-8).

Table 3-8 Summary of the Tactical Level Approach of Cross-Fertilization

Tactical Level Approach		*Evidence From The Case*
ES as Space	Communication Space	■ ES enabled Production Department to discuss routine changes with other departments
Cross-Fertilization Configuration	Mesh Network	■ IT staff worked with staff from the Finance Department closely during ERP implementation ■ Production staff worked with IT staff closely during ERP implementation
Role of Pollinators	Involved staff As Knowledge Ambassadors	■ IT staff introduced necessary IT knowledge to financial staff, and financial staff introduced the financial routine to IT staff ■ IT staff shared IT knowledge with production staff, and the production staff shared their routines with IT staff.
Implication of Cross-Fertilization	Conjunction of trajectory schemes across interconnected routines	■ Based on the knowledge of trajectory scheme of financial routines acquired, IT staff revised the IT development routine to better serve the changes needed in the trajectory schemes of financial routines in ERP implementation, such as the financial routine for managing bank accepted bill transferred across subsidiaries. ■ Based on IT knowledge acquired, production staff further improved their trajectory schemes by proposing new IT components to adopt.

3.2.5.5 Cross-Fertilization at the Operational Level

ES as Space: Regulating Space

Regarding the actual operation of organizational behaviors, ES serves as a regulating space. Since ES stores a substantial amount of information regarding the organizational routines, and the use of ES is usually deeply embedded in the performance of routines, ES guide the performance of organizational routines by defining the key actions that are mandatory in actual operation. Without ES, different actors may bypass necessary actions in practice, which increases the uncertainty of routine performance and makes coordination across different routines more difficult. This is particularly important in the process of routinize certain new practices. Hence, ES serves an important foundation to further coordinate individuals' behaviors within the organization. In Wanhua's case, the ES enforce Informant #4 to operate certain actions required by Finance Department, even she knew little about why to do that and felt reluctant to do so.

Cross-Fertilization Configuration: Radial Network

I name the cross-fertilization configuration of this operational level approach as a ***radial network***. Table 3-6 shows an illustration of the pattern of radial network. Such a radial network has a central knowledge block, to which some other knowledge blocks are connected. All these knowledge blocks are embodied by routines of different business functions. Different from the knowledge transfer in a mesh network, where the knowledge transfer is bilateral or even multilateral, the knowledge transfer under such a radial network is unidirectional, from the central knowledge block to other knowledge blocks. Hence, while the mesh network is especially suitable for

cross-functional in-depth communication, the radial network is more suitable for efficiently disseminating knowledge at a relative general level.

In Wanhua's case, the company established radial networks by carrying out various corporate training programs. For instance, the company sent a large group of non-accounting/finance staff to enroll in a Master degree program in Accounting, so as to facilitate the transfer of knowledge regarding financial routines from the trainers to staff in other departments. Another example is that, the company sent a group of staff, most of which were from non-IT departments, to undertake the SAP certificated training course.

Role of Pollinators: Selected Trainers as Knowledge Distributors

The ***selected trainers*** for the corporate training programs regarding various organizational routines are identified as pollinators under this approach, and they perform as ***knowledge distributors*** in the process of cross-fertilization.

The trainers could be internal experienced staff (such as a manager of the Production Department for teaching the production routine to staff from other departments), or external professionals (such as an accounting professor for giving accounting courses to accounting/finance novices). In either case, selected trainers have the expertise regarding a particular business domain and master the designs or rules of the corresponding organizational routines.

With their expertise, these trainers are expected to share their knowledge to the novices in the organization. In other words, they could possibly be pollinators for the organization, if the training are given to staff from other business domains. Compared with the involved staff as knowledge

ambassador under a mesh network, the trainers neither engage their trainees with an in-depth communication along real collaboration during work, nor participate the trainees' attempt processes to incorporate new knowledge into their existing routine. They only explicitly introduce their business domain knowledge to their trainees. Hence, I label the role of these selected trainers as knowledge distributors.

Implications of Cross-Fertilization: Conformity of Trajectory Actions across Interconnected Routines

The first two approaches of cross-fertilization discussed earlier arrange staff to learn new knowledge from different business domains by working on tasks related to new business domains, which triggers significant reconfiguration regarding the ostensive aspects of routines, i.e., trajectory projection and trajectory schemes. Compared to those two approaches, this third approach seemingly only arrange staff to learn cross-functional knowledge by taking courses, without linking the learning process to the tasks due in the trainees' departments and generating routine reconfiguration accordingly. However, this approach of cross-fertilization also plays a significant role in the routine reconfiguration of interconnected routines, particularly regarding the trajectory actions.

While organizational routines are generally stable as they are carried out against the ostensive aspects of organizational routines, satisfactory trajectory actions shall not be taken for granted, as routines in practice are ever-changing (Feldman and Pentland 2003; Pentland *et al.* 2011). In particular, the context-dependent nature of routine performance embeds rich

variations between the ostensive aspect and performative aspect of routines (Feldman and Pentland 2003).

A major endogenous source of such variations is the actors of routines (Howard-Grenville 2005; Leonardi 2011). Since the performance of routine is context-dependent, the actors of an organizational routine have to decide the particular trajectory action to undertake in response to the particular context (Cohen *et al.* 1996; Teece and Pisano 1994; Teece *et al.* 1997). Moreover, the actors of the routine would conduct reflective self-monitoring to make sense of their actions, and introduce variations in accordance to their personal judgments (Giddens 1984). In fact, such an endogenous driver of change is even more influential than many exogenous sources of changes (Pentland *et al.* 2011), such as the changing of technology and exceptional inputs (Edmondson *et al.* 2001; Perrow 1967).

The actors of organizational routines may always introduce variations to trajectory actions based on their interpretation on the situation at the spot of performing routine, even when the context is highly constrained (Victor *et al.* 2000). Without proper intervention, it is highly possible for these actors to resist the expectation on routine performance and do otherwise in the performance of a single routine, when the organizational context is more challenging to perform the routines as expected (Giddens 1984; Orlikowski 2000). Such variations are also significant in the performance of interconnected routines. Unlike the performing of an isolated routine, in which all the actors have certain levels of knowledge about how the complete routine works, and are able to interpret peer actors' behavior, make predictions and judge how to collaborate to enhance the routine performance (Feldman and

Pentland 2003), actors in performing interconnected routines are usually lacking in knowledge about other interconnected routines. These actors without cross-functional knowledge may easily neglect the dynamics happening at their counter parts, fail to collaborate well, and carry out unsatisfactory trajectory actions.

For instance, in Wanhua's case, Informant #4 as a staff in the Marketing Department knew little about the financial routines, but was required to act in tandem with financial staff. This led to potential issues in the actual performance, such as incongruity between actual performance and routine design, confusion to cope with unexpected situations, and difficulty in predicting the progress of performing interconnected routines. Just as Informant #4 described: "*For instance, I want to dispatch an order TODAY. However, I just realized that I have to find the financial staff to approve* [the *Letter of Credit*] *or complete other procedures before dispatch. And the financial staff may not be available to get my request done today. That would make things headache.*"

Based on ES as a regulating space, a radial network as cross-fertilization configuration and selected trainers as knowledge distributors, an organization is enabled to improve its existing trajectory actions by strengthening the actors' capability on making interpretation and judgment when interconnected routines are carried out. The radial network of cross-fertilization configuration ensures that the pollinators under such configuration share their business domain knowledge with staff from many other business domains, which is necessary to achieve satisfactory trajectory actions.

Meanwhile, the selected trainers as knowledge distributors strongly facilitate the knowledge sharing process. By popularizing the trajectory projection and trajectory scheme of other different routines that are related to the actors' own routines, the actors can better understand the design and operation of these interconnected routines. Accordingly, actors can better interpret the situation and act in coordination with peers in other routines, avoiding unfavorable variations in trajectory actions. Moreover, the trajectory actions of interconnected routines carried out by different individuals will be more consistent towards the trajectory projections and trajectory schemes. This is a significant improvement in routine at the operational level. Therefore, I identify the key implication of this operational level approach as the enforcement of trajectory actions across interconnected routines. In Wanhua's case, the related training in accounting did enable Informant #4 to better cope with her collaboration with financial staff regarding the trajectory action of her routine.

A summary of this approach is presented below (see Table 3-9).

Table 3-9 Summary of the Operational Level Approach of Cross-Fertilization

Operational Level Approach		***Evidence From The Case***
ES as Space	Regulating Space	■ ERP made certain actions in the business practices of the marketing staff mandatory.
Cross-Fertilization Configuration	Radial Network	■ The company sent staff from various business domains to a Master degree program in Accounting (MPAcc), in order to better achieve ERP implementation. ■ The company promote internal training programs from the IT Department, in order to better achieve ERP implementation. ■ The company sent staff from various business domains to SAP specialist training, in order to better achieve ERP implementation.
Role of Pollinators	Selected Trainers As Knowledge Distributors	■ Accounting professionals taught students from non-financial departments, so that the students could better understand the financial rational behind the design of ERP systems. ■ IT professionals trained non-IT staff on ERP usage to foster the transformational process carried out by ERP implementation.
Implications of Cross-Fertilization	Conformity of trajectory actions across interconnected routines	■ Marketing staff can better adhere to routine design in their trajectory actions. ■ Non-IT staff can better cooperate with IT staff in their trajectory actions. They even came up with new ideas of their own IT solutions during their routine performance.

3.2.6 Conclusion and Future Research

3.2.6.1 Theoretical and Practical Contributions

This study contributes to extant literature in several ways. First, this study is among the first to explore the dynamics among interconnected routines. While extant routine literature has mainly focused on single routines (D'Adderio *et al.* 2012), few studies investigate how multiple routines in a system interact with each other. This study contributes to our understanding on the ecologies of routine by demonstrating the complex dynamics among interconnected routines: one routine can possibly influence the development of its interconnected routines at strategic level, tactical level and operational level, respectively. This is critical as it shed lights on how routine evolve in a particular ecosystem, so that I could better understand the dynamics of organizational routines in an organizational setting.

Second, this study contributes to our understanding on IT-enabled organizational transformation from a routine perspective. In particular, this study suggests that, in IT-enabled organizational transformation, reconfiguration of interconnected routines can be achieved via the process of the cross-fertilization of business domain knowledge. Since prior routine literature has mainly focused on single routines (D'Adderio *et al.* 2012), we have limited understanding on how to leverage the existence of interconnected routines for purposefully organizational transformation. Yet, the rapid advancement and wide application of information technologies serve as an important facilitator in modern organizations, to make more organizational routines connect with each other for better organizational performance. Hence,

this study shed lights on how to manage IT-enabled organizational transformation.

Third, by adopting trajectory perspective, this study further enriches our understanding on routine reconfiguration by identifying three approaches of inter-routine reconfiguration at strategic, tactical and operational levels respectively. In particular, this study finds that for each approach, organizations need to adopt ES as knowledge exchange space, design a configuration of cross-fertilization of business domain knowledge, and arrange key actors as pollinators to enact the routine reconfiguration process. Since prior literature is very limited regarding how to purposefully conduct routine reconfiguration, especially in inter-routine reconfiguration, this study provides insights on the possible approaches of routine reconfiguration, as well as different mechanisms in achieving routine reconfigurations in IT-enabled organizational transformation.

In addition to theoretical contributions listed above, this study also provides significant practical implications.

First of all, I expect this study helps practitioners to better realize the importance of managing interconnected organizational routines during the process of IT-enabled organizational transformation. By adopting the trajectory perspective, this study demonstrates the complex dynamics among interconnected routines in detail, and the potential advantages when managing these routines well. Practitioners may learn from it and put more efforts on managing interconnected routines purposefully.

Second, it is hoped that this study provides insights for practitioners on the strategies that are important for planning routine reconfiguration. The three approaches of cross-fertilization identified in this study provides practitioners a set of strategies for their routine reconfiguration of interconnected routines. Given these three approaches trigger changes of trajectory projection, trajectory scheme, and trajectory action, respectively, practitioners may adopt them selectively in accordance with their situation. For instance, when the reconfiguration of interconnected routines lacks a clear direction to achieve, adopting a strategic level approach of cross-fertilization may bring insightful ideas on specifying a valuable goal for the existing routines, leading to meaningful routine reconfigurations. I hope this study enrich practitioners' understanding on the strategic planning of routine reconfiguration, and equip them with better strategic options when enacting routine reconfiguration in their IT-enabled organizational transformations.

Third, through the case examples presented in this study, practitioners may have a deeper understanding on how the reconfiguration of interconnected routines had been done in IT-enabled organizational transformation in detail. This may envision the process and challenges in their own practices, and serve as a source of inspiration for their decision making during such organizational transformation.

3.2.6.2 Limitations and Future Research Directions

This study is not without limitations. First, the context of this case study is based on a traditional manufacturer implementing its organizational transformation with the help of ES. In such an organizational context, this study mainly focuses on the reconfiguration of interconnected routines that are

carried out within the case organization. However, organizations in the contemporary business world vary in terms of size, structure, IT capabilities, etc. These diverse organizational contexts highlight more issues on routine reconfiguration. For instance, in an organization outsourcing a significant portion of its work, the organization has to work closely with many business collaborators. In such a case, I would need to further understand the reconfiguration of interconnected routines across organizations. Hence, future research may further explore routine reconfiguration in other organizational contexts.

Second, this study mainly provides a solution on how to make the utmost use of existing organizational knowledge in order to reconfigure routines. Future research may examine the influences and corresponding mechanisms of external knowledge on the process of routine reconfiguration.

Third, this study merely investigates one type of routine dynamics within the ecosystems of organizational routines. Future research may explore other routine dynamics among interconnected routines, such as the emergence and evolution of interconnected routines.

Last but not least, since this study adopts the case study methodology, it does not aim at establishing the validity or statistically testing the generalizability of a particular finding (Staudenmayer *et al.* 2005). Future studies may investigate this topic using other methodologies.

3.2.6.3 Conclusion

This case study investigates the mechanisms to achieve reconfiguration of interconnected routines in IT-enabled organizational transformation in traditional companies. By adopting the conceptualization of organizational routine as trajectory, it elucidates the routine reconfiguration of interconnected routines that can be achieved via the process of cross-fertilization of business domain knowledge. In such a process, three approaches of cross-fertilization are identified, with the configurations of cross-fertilization, the roles of pollinators, and the implications of routine reconfiguration described respectively. This study proposes that future research in this area is theoretically and practically important.

3.3 An Integrated Analysis of Two Cases

The Haier and the Wanhua cases are contrasted against each other by comparing the types of routine reconfiguration, the key task of organizational transformation, and the mechanisms of routine reconfiguration. A summary of the comparison and contrast between the cases is shown in Table 3-10, and the detailed comparison and implications are discussed next.

Table 3-10 Summary of Cross-Case Analysis

		Haier	***Wanhua***
Type of Routine Reconfiguration		Intra-routine reconfiguration	Inter-routine reconfiguration
Key Task of IT-enabled Organizational Transformation		Capability Building	Capability Enhancement
Mechanisms of Routine Reconfiguration	***Change of Trajectory Projection***	Abstraction	Coalescence
	Change of Trajectory Scheme	Reflection	Negotiation
	Change of Trajectory Action	Improvisation	Education
Implications 1		Routine reconfiguration for IT-enabled organizational transformation	
Implications 2		Distributed approach	
Implications 3			Integrative approach

3.3.1 Types of Routine Reconfiguration

In Chapter 1, it was stressed that the Haier and Wanhua cases represent two types of routine reconfigurations: intra-routine reconfiguration and inter-routine reconfiguration. Intra-routine reconfiguration is concerned with how a particular routine evolves through interaction with its environment (e.g., Anand *et al.* 2012; Feldman 2004; Goh *et al.* 2011; Pentland *et al.* 2011; Turner and Rindova 2012; Zollo and Winter 2002; Zott 2002), while inter-routine reconfiguration is concerned with how one routine is established or changed due to other routines (e.g., Agarwal *et al.* 2012; Raman and Bharadwaj 2012). In particular, to identify the type of routine reconfiguration to undertake, I examined whether there were sequential or reciprocal impacts among the focal routines. In other words, I examined whether there was a

potential for finding out if the consequences of the focal routine would impact another routine, producing further consequences (Strauss 1993; Thompson 1967).

In Haier's case, I examined two main routines in order fulfillment, namely, the order distribution routine and the service routine. The reconfiguration of both routines is considered as intra-routine reconfiguration, because order distribution routine and service routine are two independent routines. The reconfiguration of both routines are drastic and suitable for examining intra-routine reconfiguration. Although there might be interactions between the reconfiguration processes of both routines, they are not considered as the focus of this study.

As for Wanhua's case, I examined several pairs of interconnected routines, including (1) the procurement routine and finance routine, (2) the IT development routine and finance routine, and (3) the product exportation routine and the finance routine. The reconfiguration of these pairs of routines is considered as inter-routine reconfiguration because the two routines in each related pair are highly related to sequential or reciprocal impacts. For instance, in the first pair of interconnected routines, change in financial routines (e.g., changing the criteria in evaluating finance-related actions) lead to change in procurement routine (e.g., a change in the approach used in the procurement routine), which in turn leads to change in finance routine again (e.g., change in tasks in the financial routine).

3.3.2 Key Task of IT-Enabled Organizational Transformation

Corresponding to the two types of routine reconfigurations, the Haier and Wanhua cases represent two types of IT-enabled organizational transformations with different key tasks, namely capability building and capability enhancement. In particular, capability building is about establishing a set of capability that is highly critical for the success of organizational transformation. Establishing new capability is a mission in response to significant change at strategy level, hence it often involves fundamental changes in strategy, core values, or corporate identity (Dutton and Dukerich 1991; Fox-Wolfgramm *et al.* 1998; Newman 2000). On the contrary, capability enhancement is about further developing certain capability upon a given strategy, core values, or corporate identity. This task often involve adjustments in systems, processes, or structures, but do not involve the fundamental changes in the case of capability building (Dutton and Dukerich 1991; Fox-Wolfgramm *et al.* 1998; Newman 2000).

In Haier's case, the company's e-commerce strategy implementation is a process of capability building as the company's new strategy on e-commerce altered the design of company's core capability. In particular, Haier's e-commerce strategy fundamentally altered its retailing channel strategy (i.e., adding an online retail channel to its existing offline wholesale channel), value proposition and corporate identity (i.e., from a mass-product provider to a customized-product provider). To achieve such a drastic change of the corporate strategy, it "takes organizations outside their familiar domains and alters bases of power" (Starbuck 1983, p. 99). Hence, Haier's organizational transformation relies on sufficient capability building, and it did involve large-

scale and dramatic new capability development (Meyer 1982; Newman 2000; Tushman and Romanelli 1985).

In such a transformational process, each organizational routine needs to be reshaped significantly in order to afford the new capability required. Before each routine is capable of properly carrying out the expected goal, it would not prove effective to further coordinate multiple routines. Accordingly, the reconfiguration of organizational routine occurs primarily within the scope of each routine. Therefore, Haier has capability building as the key task in its organizational transformation, which provides a proper scenario to put more efforts and attention on intra-routine reconfiguration.

In the case of Wanhua, the company's ES-enabled productivity improvement is a process of capability enhancement. This is because Wanhua went through a series of internal adjustments in the systems and practices of various departments which improved the fit and consistency between the organization and its organizational context, but did not initiate changes regarding core strategy, value or identity of the organization (Newman 2000). In such a situation, since each routine could generally afford certain level of the capabilities needed, a significant amount of transformational effort lay in the coordination of multiple routines that were unfit, inefficient or inconsistent with each other. Therefore, Wanhua has capability enhancement as its key task in its organizational transformation, which provides an appropriate scenario to focus on inter-routine reconfiguration.

3.3.3 Mechanisms of Routine Reconfiguration

By adopting "routine as trajectory" (Strauss 1993) as my theoretical lens, I examined the mechanism of routine reconfiguration in the case analysis. In particular, in both cases, the routine reconfiguration taken place can be decomposed into the changes of trajectory projection, trajectory scheme, and trajectory action. In this section, I summarized the mechanisms of the changes of different trajectory elements as below.

Change of Trajectory Projection

In Haier's case, the changes of trajectory projection were essentially conducted via ***abstraction*** based on the existing trajectory scheme and trajectory action.

The abstraction based on the existing trajectory scheme refers to the process of trajectory scheme elevating trajectory projection (see Section 3.1.5.2 for detail). In particular, existing trajectory scheme may provide rich connotations that allow managers to extract new strategic thinking for improving existing trajectory projection. For instance, Haier's Service Department extracted the visionary idea of "one-stop service" from a series of new trajectory schemes in the department.

The abstraction based on the existing trajectory action refers to the process of trajectory action renovating the trajectory projection (see Section 3.1.5.3 for detail). In particular, existing trajectory actions may provide inspirational materials for managers to come up with new ideas for trajectory projection. For instance, after the staff creatively delivered cards and flowers together with home appliance orders in response to unexpected customers'

needs, the Service Department extracted the idea of “customized service” based on such trajectory action.

Since trajectory projection is the vision of a particular routine, which is the most abstract components compared with trajectory scheme and trajectory action, I use “abstraction” to label the process of changing trajectory projection in intra-routine reconfiguration, as discussed above.

In Wanhua’s case, the changes of trajectory projection were essentially conducted via ***coalescence*** on existing trajectory projections across interconnected routines. In particular, in order to change the trajectory projections of multiple interconnected routines for a better coordination, the organization conducted cross-fertilization of business domain knowledge in a strategic level approach (i.e., internal job rotation). By establishing point-to-point construction and selecting managers as knowledge combinators in such cross-fertilization, the selected managers may have sufficient understanding regarding the trajectory projections of interconnected routines, and launch revisions accordingly on the trajectory projection he or she is in charge of, for better coordination among trajectory projections of interconnected routines (see Section 3.2.5.3 for detail). I label such process as “coalescence”.

Change of Trajectory Scheme

In Haier’s case, the changes of trajectory scheme were essentially conducted via ***reflection*** based on existing trajectory projection and trajectory action.

The reflection based on existing trajectory projection refers to the process of trajectory projection steering trajectory scheme (see Section 3.1.5.2 for detail). In particular, existing trajectory projection provides vision and expectations for the performance of trajectory scheme, which serve as the ultimate benchmark to evaluate whether trajectory scheme shall be changed. Such benchmark is particularly important when the internal and external environment of an organization has been changing in the organizational transformation. By constantly reflecting the design of trajectory scheme based on existing trajectory projection, managers may identify inappropriate trajectory schemes to be replaced and improved trajectory schemes to be included. For instance, after the IT systems of both the Logistics Department and the Service Department were upgraded, the staff of both departments reflected on whether their existing trajectory scheme could achieve the most customer satisfaction, and found that the two departments could collaborate together to introduce “installation on delivery” into the existing trajectory scheme.

The reflection based on existing trajectory action refers to the process of trajectory action challenging trajectory scheme (see Section 3.1.5.1 for detail). In particular, existing trajectory action provides empirical evidence on whether the trajectory scheme can be executed smoothly. By constantly reflecting the design of trajectory scheme based on trajectory action, managers can identify issues exposed in the deviation between trajectory scheme and trajectory action, leading to further refinement. For instance, at the beginning of processing online orders, the trajectory action of Logistics Department failed in delivering orders on time. By reflecting why the trajectory action

didn’t meet the trajectory scheme, the managers initiate a series of changes on trajectory scheme for better design.

Accordingly, as discussed above, I use “reflection” to label the process of changing trajectory scheme in intra-routine reconfiguration.

In Wanhua’s case, the changes of trajectory scheme were essentially conducted via ***negotiation*** on existing trajectory schemes across interconnected routines. In particular, in order to change the trajectory scheme of multiple interconnected routines for a better coordination, the organization conducted cross-fertilization of business domain knowledge at tactical level (i.e., internal collaboration). By establishing a mesh network and involving staff members related to these routines as knowledge ambassadors, the staff members involved may introduce their trajectory scheme to staff members in other interconnected routines, as well as learn trajectory scheme of other interconnected routines in depth.

This corresponds to my findings that, as pollinators in the cross-fertilization of business domain knowledge in a tactical level approach, involved staff served as knowledge ambassadors during this process (see Section 3.2.5.4 for detail). I label such process as “negotiation”.

Change of Trajectory Action

In Haier’s case, the changes of trajectory action were essentially conducted via ***improvisation*** based on the ostensive perspective of trajectory, i.e., trajectory projection and trajectory scheme.

The improvisation based on existing trajectory projection refers to the process of trajectory projection stimulating trajectory action (see Section 3.1.5.3 for detail). In particular, existing trajectory projection provides the goals of the routine as ultimate criteria to examine whether a trajectory action is appropriate. Hence, it provides legitimacy for the trajectory action to generate new ideas according to both the trajectory projection and the actual situation when performing the routine. This is a typical improvisation process. For instance, as the trajectory projection of service routine requires maximum customer satisfaction, the staff members of the Service Department had to improvise in various scenarios, e.g., carrying large refrigerators on their back to complete door-to-door delivery in rural area.

The improvisation based on existing trajectory scheme refers to the process of trajectory scheme reforming trajectory action (see Section 3.1.5.1 for detail). In particular, since trajectory scheme provides a template for behavioral or normative goals to operate, the trajectory action, which is the actual performance of routine, requires further improvisation on such template according to the particular organizational context to operationalize the template. For instance, despite an existing trajectory scheme regulating how to proceed with orders in the order distribution routine, the staff members of the Logistics Department still need to improvise their behavior in different situations, such as an order peak with over 1,400 orders placed in one single day in 2011.

Accordingly, as discussed above, I use “improvisation” to label the process of changing trajectory action in intra-routine reconfiguration.

In Wanhua's case, the changes of trajectory action were essentially conducted via ***education*** on the ostensive aspect of trajectory across interconnected routines. In particular, in order to improve the trajectory actions of multiple interconnected routines for a better coordination, the organization conducted cross-fertilization of business domain knowledge (i.e., training policies). By establishing a radial network and selecting trainers related to these routines as knowledge distributors, the selected trainers teach the organizational staff as trainees with necessary knowledge on a cross-functional business domain. By doing so, the trainees can incorporate these new knowledge in their own trajectory actions, so that they could better adjust themselves and collaborate with staff from different business domains.

This corresponds to my finding that, as pollinators in the cross-fertilization of business domain knowledge in an operational level approach, selected trainers served as knowledge distributor for better interpretation and decision making when carrying out the trajectory actions of interconnected routines (see Section 3.2.5.5 for detail). I label such process as "education".

3.3.4 Implications

Implications 1: Routine Reconfiguration Facilitated IT-Enabled Organizational Transformation

In both the Haier and Wanhua cases, the IT-enabled routine reconfiguration facilitated both case organizations' IT-enabled organizational transformation. In the first case, Haier acquired the capability to conduct e-commerce by reconfiguring its order distribution and service routines. In the

second case, Wanhua acquired better organizational performance by reconfiguring a series of interconnected routines. Both cases suggest that a successful organizational transformation requires appropriate changes in their organizational routines.

Implications 2: Distributive Approach for Capability Building

The key task of organizational transformation in the Haier case was capability building, which involved the establishment of new capabilities necessary for a new strategy, core values, and corporate identity.

In Haier's case, such a necessity to build new capabilities accounted for why the company needed intra-routine reconfiguration, i.e., to reconfigure order distribution routine and service routine independently. Before the intra-routine reconfiguration, the company could neither efficiently deliver large volume orders from individual customers based on its existing routine for wholesale order delivery, nor efficiently serve customers from its online channel using its existing routine for customers of offline distributors. Therefore, Haier had to reconfigure its routines separately so that acquiring the capability needed at each step of the completion of new organizational tasks. With each routine becoming more compatible with the new organizational context, the company reshaped how it performs organizational tasks as a whole, and achieved successful organizational transformation. I identify this approach for radical organizational transformation as the distributive approach.

Implications 3: Integrative Approach for Capability Enhancement

The key task of organizational transformation in the Wanhua case was capability enhancement, which serves as efforts to coordinate unfit or inconsistent organizational practices in the new organizational context.

During Wanhua's organizational transformation, such a necessity to coordinate multiple routines accounted for why the company spent significant efforts on inter-routine reconfiguration, in particular, implementing three types of cross-fertilization of business domain knowledge. Before the inter-routine reconfiguration, the company could not satisfy its growing needs from the market since its internal operation lacked coordination, e.g., the procurement staff purchased raw materials using different financial criteria adopted by the financial staff. To deal with such an issue, Wanhua reconfigured its interconnected routines by transferring business knowledge between the participants of these routines. Different approaches of cross-fertilization call for different focuses on coordination, which could be the goals, the detailed plan, or the actual performance of each routine. Thus, the company coordinated the unfit or inconsistent routines a whole, reconfigured them accordingly, and achieved successful organizational transformation. I identify this approach for incremental organizational transformation as the integrative approach.

Chapter 4. Conclusion

The objectives of this thesis were to unravel the mechanisms underlying successful IT-enabled organizational transformation from the perspective of organizational routine. I examined two types of routine reconfiguration in the context of IT-enabled organizational transformation, namely, (1) intra-routine reconfiguration, and (2) inter-routine reconfiguration. In particular, I investigate routine reconfiguration in IT-enabled organizational transformation by studying the following three questions:

1. What are the roles of routine reconfiguration in IT-enabled organizational transformation? ***(Study I)***
2. How an organization reconfigured single routines in IT-enabled organizational transformation? ***(Study I)***
3. How an organization reconfigured interconnected routines in IT-enabled organizational transformation? ***(Study II)***

In Study I titled "Routine Reconfiguration in Traditional Companies' E-Commerce Strategy Implementation: A Trajectory Perspective", I conducted a case study on the intra-routine reconfiguration of a traditional company under e-commerce strategy implementation, and investigated the roles of routine reconfiguration and the corresponding mechanisms in the e-commerce strategy implementation of traditional companies. In particular, I identified three roles of routine reconfiguration in traditional companies' e-commerce strategy implementation, namely, routine reconfiguration as deconstruction of operational inertia, routine reconfiguration as reposition of

strategic intent, and routine reconfiguration as rejuvenation of flexibility and innovation.

Further, by drawing upon the literature of "routine as trajectory" (Obstfeld 2012; Strauss 1993), this study elucidates the mechanisms to achieve the three roles of routine reconfiguration respectively. Specifically, routine reconfiguration deconstructs operational inertia through the interaction between the trajectory scheme and the trajectory action: the trajectory scheme reforms the trajectory action, and the trajectory action challenges the trajectory scheme. Routine reconfiguration repositions an organization's strategic intent in e-commerce strategy implementation through the interaction between the trajectory projection and the trajectory scheme: the trajectory projection guides the trajectory scheme to align with the trajectory projection and thus legitimates its changes, while the trajectory scheme elevates the trajectory projection. Routine reconfiguration rejuvenates flexibility and innovation in e-commerce strategy implementation in traditional companies through the interaction between the trajectory projection and the trajectory action.

Findings from this study contributed to the extant literature by (1) extending research on e-commerce strategy from the perspective of organizational routines by providing a framework for understanding the roles of routine reconfiguration in the e-commerce strategy implementation, (2) unveiling the interactions among different components of routines in e-commerce strategy implementation, and (3) suggesting the importance of understanding e-commerce strategy implementation in e-commerce strategy literature. It also provide implications for practitioners in (1) providing insights on how to implement e-commerce strategies from the perspective of

routine reconfiguration, (2) providing insights on how to manage routine reconfiguration from the perspective of trajectory. For detailed discussion on the implications of this study, see Section 3.1.6.

In Study II titled “IT-Enabled Reconfiguration of Interconnected Routines: A Trajectory Perspective”, I conducted another case study to investigate the inter-routine reconfiguration of a company conducting organizational transformation via ERP implementation. In this study, by drawing from “routine as trajectory” (Obstfeld 2012; Strauss 1993), I find that the reconfiguration of interconnected routines can be achieved via cross-fertilization of business domain knowledge.

Furthermore, three approaches of cross-fertilization are identified, with the roles of ES, configurations of cross-fertilization, the roles of pollinators, and the implications of routine reconfiguration described respectively. Specifically, in the strategic level approach, an organization may achieve the synergy of trajectory projections across interconnected routines by adopting a point-to-point construction of cross-fertilization configuration and selected managers as knowledge combinators, with ES as educational space. In the tactical level approach, an organization may achieve conjunction of trajectory schemes across interconnected routines by adopting a mesh network of cross-fertilization configuration and involved staff as knowledge ambassadors, with ES as communication space. Last but not least, in the operational level approach, an organization may achieve conformity of trajectory actions across interconnected routines by adopting a radial network of cross-fertilization configuration and selected trainers as knowledge distributors, with ES as regulating space.

This study contributes to extant literature by (1) enhancing our knowledge on how to conduct organizational transformation from the perspective of organizational routine by identifying that routine reconfiguration in IT-enabled organizational transformation shall be achieved via cross-fertilization of interconnected routines, (2) is among the first to explore the dynamics among interconnected routines and demonstrates the complex dynamics among interconnected routines: one routine can possibly influence the development of its interconnected routines at strategic level, tactical level and operational level, respectively, and (3) contributes to our understanding on routine reconfiguration by identifying three approaches of cross-fertilization. For practitioners, this study highlights the importance of managing interconnected organizational routines during the process of IT-enabled organizational transformation. In addition, this study provides examples and strategies on how to carry out the reconfiguration of interconnected routines. For detailed discussion on the implications of this study, see Section 3.2.6.

In addition to the two studies, an integrative analysis of the two cases is also conducted to further analyze the two cases and reveal managerial insights on routine reconfiguration. In particular, three implications are identified: (1) both cases suggest that routine reconfiguration facilitates IT-enabled organizational transformation in different types of organizational transformation. (2) Organization may adopt a distributive approach to conduct routine reconfiguration when the aim of organizational transformation is capability building. (3) Organization may adopt an integrative approach to conduct routine reconfiguration when the aim of organizational transformation

is capability enhancement. This integrative analysis further contributes to our knowledge on how to conduct routine reconfiguration by indicating different strategies for different circumstances.

Table 4-1 summarizes the key findings and contributions that emerged from the two studies in this thesis.

While the studies of this thesis provide fresh insights on routine reconfiguration in IT-enabled organizational transformation, its findings and contributions (as shown in Table 4-1) should be viewed and interpreted in the light of a few limitations that are worth mentioning at this point. First, in this thesis I adopted case study methodology in all the studies. For instance, in Study I, I conducted a case study of Haier for its intra-routine reconfiguration during its e-commerce strategy implementation. In Study II, I conducted another case study of Wanhua for its inter-routine reconfiguration. The nature of case study methodology is to establish internal validity instead of external validity. Hence, while these studies serve as theoretical explorations on my research topic, it is not appropriate to seek generalizability or statistical test in these findings.

Second, while it is possible that both intra- and inter- routine reconfiguration take place within the same organization, the two studies of this thesis only focus on one type of routine reconfiguration. The interaction between the intra-routine reconfiguration and inter-routine reconfiguration is not in the scope of this thesis yet also deserve further research attention.

Table 4-1 Summary of Key Findings and Contributions of Study I and Study II

Key Findings	***Contributions***
Study I: Intra-Routine Reconfiguration	
1. Routine reconfiguration plays three roles in traditional companies' e-commerce strategy implementation, namely, routine reconfiguration as deconstruction of operational inertia, routine reconfiguration as reposition of strategic intent, and routine reconfiguration as rejuvenation of flexibility and innovation. 2. The mechanisms to achieve the roles of routine reconfiguration respectively are identified as follows: a. Deconstruction of operational inertia: the trajectory scheme reforms the trajectory action, and the trajectory action challenges the trajectory scheme. b. Reposition of strategic intent: the trajectory projection guides the trajectory scheme to align with the trajectory projection, while the trajectory scheme elevates the trajectory projection. c. Rejuvenation of flexibility and innovation: the trajectory projection stimulates the emergence of a trajectory action that is new to the trajectory scheme, and the trajectory projection is renovated by extracting the flexible and innovative ideas of the trajectory action.	1. This study extends research on e-commerce strategy from the perspective of organizational routines by providing a framework for understanding the roles of routine reconfiguration in the e-commerce strategy implementation. 2. This study unveils the interactions among different components of routines in e-commerce strategy implementation. 3. This study suggests the importance of understanding e-commerce strategy implementation in e-commerce strategy literature. 4. This study provides insights for practitioners on how to implement e-commerce strategies from the perspective of routine reconfiguration. 5. This study provides insights for practitioners on how to manage routine reconfiguration from the perspective of routine reconfiguration.

Key Findings	*Contributions*
Study II: Inter-Routine Reconfiguration	
1. Reconfiguration of interconnected routines can be achieved via the process of cross-fertilization of business domain knowledge. 2. Three approaches of cross-fertilization are identified, with the roles of ES, configurations of cross-fertilization, the roles of pollinators, and the implications of routine reconfiguration described respectively. a. Strategic level: synergy of trajectory projections across interconnected routines may be achieved by adopting a point-to-point construction of cross-fertilization configuration and selected managers as knowledge combinators, with ES as educational space. b. Tactical level: conjunction of trajectory schemes across interconnected routines may be achieved by adopting a mesh network of cross-fertilization configuration and involved staff as knowledge ambassadors, with ES as communication space. c. Operational level: conformity of trajectory actions across interconnected routines may be achieved by adopting a radial network of cross-fertilization configuration and selected trainers as knowledge distributors, with ES as regulating space.	1. This study enhances our knowledge on how to conduct organizational transformation from the perspective of organizational routine by identifying that routine reconfiguration in IT-enabled organizational transformation shall be achieved via cross-fertilization of interconnected routines. 2. This study is among the first to explore the dynamics among interconnected routines. It demonstrates the complex dynamics among interconnected routines: one routine can possibly influence the development of its interconnected routines at strategic level, tactical level and operational level, respectively. 3. This study contributes to our understanding on routine reconfiguration by identifying three approaches of cross-fertilization. 4. For practitioners, this study highlights the importance of managing interconnected organizational routines during the process of IT-enabled organizational transformation. In addition, this study provides examples and strategies on how to carry out the reconfiguration of interconnected routines.

Third, for both cases of this thesis, I mainly focuses on IT-enabled routine reconfiguration within one organization. Both case organizations are traditional manufacturing companies that produce products and serve customers all by themselves. However, since contemporary organizations often tend to be highly specialized and collaborate with each other, routine reconfiguration could be inter-organization instead of intra-organization. For instance, in an organization with a significant proportion of work outsourced to other organizations, the organizational routine involves inter-organizational routine reconfiguration.

Fourth, for both cases of this thesis, I mainly focus on the routine reconfiguration of a traditional organization. However, organizations in the contemporary business world vary in terms of size, structure, IT capabilities, etc. The routines of some emerging forms of organizations, such as self-organizing organizations, may significantly differ from the routine of a traditional organization, and hold refreshing processes and mechanisms of routine reconfiguration.

Generally, routine reconfiguration in IT-enabled organizational transformation is critical for organizational success yet remains under-explored, and therefore deserves considerable research attention. All the studies together clearly bring out some important considerations for future researchers examining routine reconfiguration. First, researchers may extend research on routine reconfiguration in IT-enabled organizational transformation into other organizational contexts. Specifically, researchers may investigate the routine reconfiguration in other typically IT-enabled organizational contexts such as self-organizing organizations and outsourcing

organizations. These research contexts may provide other possibilities in the processes and mechanisms of routine reconfiguration, and would help to gain a more comprehensive understanding on routine reconfiguration.

Second, researchers may further examine the reconfiguration of inter-organizational routines in IT-enabled organizational transformation. As discussed earlier, this corresponds to the trend of the contemporary business world, where the business operations are divided and then placed in the charge of highly specialized individuals or organizations. Hence, most organizations have to coordinate with a greater number of business partners, such as varying service providers along the value chain. Research on the reconfiguration of inter-organizational routines would further expand our knowledge on routine reconfiguration and IT-enabled organizational transformation.

Third, researchers may further explore the interaction between intra-routine reconfiguration and inter-routine reconfiguration. As both forms of routine reconfiguration are likely to exist in same organizations, the discussion on such interaction effect would be helpful for establishing a more comprehensive understanding on how to manage organizational routines for IT-enabled organizational transformation.

Fourth, researchers may further explore different types of organizational routines and their reconfiguration in different organizational contexts. For instance, how does a self-organizing organization establish and reconfigure its routines, to maintain its vigor and longevity. Different forms of organization provide me exciting opportunities to further understand the nature and management of organizational routines.

Fifth, researchers may further explore the ecologies of organizational routines. Despite Study II being an attempt to understand the dynamics among interconnected routines, our understanding on how a routine respond to the ecosystem to which it belongs is still rather limited. There are still many theoretical gaps that remain unfilled, for instance, how to manage organizational performance when multiple routines have different effects on performance. Further exploration on related issues would be of theoretical importance.

Last but not the least, researchers may incorporate other research methodologies into research on routine reconfiguration. While past routine research generally adopted qualitative methodology, it would be helpful to utilize other methodologies into this research area to establish a more comprehensive understanding of routine reconfiguration.

In sum, this dissertation is a small, albeit a significant step, in examining some of the issues in routine reconfiguration of IT-enabled organizational transformation that the academics and practitioners are currently grappling with and also charts out a roadmap for future research on the subject.

BIBLIOGRAPHY

Agarwal, R., Anand, J., Bercovitz, J., and Croson, R. 2012. "Spillovers across Organizational Architectures: The Role of Prior Resource Allocation and Communication in Post-Acquisition Coordination Outcomes," *Strategic Management Journal* (33:6), pp 710–733.

Alavi, M., and Leidner, D.E. 1999. "Knowledge Management Systems: Issues, Challenges, and Benefits," *Communications of the AIS* (1:2es), p 1.

Alavi, M., and Leidner, D.E. 2001. "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS quarterly*, pp 107–136.

Allatta, J.T., and Singh, H. 2011. "Evolving Communication Patterns in Response to an Acquisition Event," *Strategic Management Journal* (32:10), pp 1099–1118.

Amabile, T. 1996. *Creativity in Context: Update to the Social Psychology of Creativity*. Boulder, Colorado, USA: Westview Press.

Anand, G., Gray, J., and Siemsen, E. 2012. "Decay, Shock, and Renewal: Operational Routines and Process Entropy in the Pharmaceutical Industry," *Organization Science* (23:6), pp 1700–1716.

Ancona, D.G. 1990. "Outward Bound: Strategies for Team Survival in an Organization," *Academy of Management Journal* (32:2), pp 334–365.

Ancona, D.G., and Caldwell, D.F. 1992. "Bridging the Boundary: External Activity and Performance in Organizational Teams," *Administrative Science Quarterly* (37:4), pp 634–665.

Andrews, F.M. 1979. *Scientific Productivity*. Cambridge: Cambridge University Press.

Andrews, J., and Smith, D.C. 1996. "In Search of the Marketing Imagination: Factors Affecting the Creativity of Marketing Programs for Mature Products," *Journal of Marketing Research* (33:2), pp 174–187.

Barnett, W.P., and Freeman, J. 2001. "Too Much of a Good Thing? Product Proliferation and Organizational Failure," *Organization Science* (12:5), pp 539–558.

Barua, A., Konana, P., Whinston, A.B., and Yin, F. 2004. "An Empirical Investigation of Net-Enabled Business Value," *MIS Quarterly* (28:4), pp 585–620.

Becker, M.C. 2004. "Organizational Routines: A Review of the Literature," *Industrial and Corporate Change* (13:4), pp 643–678.

Becker, M.C., Knudsen, T., and March, J.G. 2006. "Schumpeter, Winter, and the Sources of Novelty," *Industrial and Corporate Change* (15:2), pp 353–371.

Benjamin, R.I., and Levinson, E. 1993. "A Framework for Managing It-Enabled Change," *Sloan Management Review* (34:4), pp 23–33.

Bettis, R.A., and Prahalad, C.K. 1995. "The Dominant Logic: Retrospective and Extension," *Strategic Management Journal* (16:1), pp 5–14.
Brandts, J., and Cooper, D.J. 2006. "A Change Would Do You Good.... An Experimental Study on How to Overcome Coordination Failure in Organizations," *The American Economic Review*, pp 669–693.
Burgelman, R.A. 2002. "Strategy as Vector and the Inertia of Coevolutionary Lock-In," *Administrative Science Quarterly* (47:2), pp 325–357.
Burns, T.E., and Stalker, G.M. 1961. *The Management of Innovation*. Tavistock.
Carlile, P.R. 2004. "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge across Boundaries," *Organization Science* (15:5), pp 555–568.
Campbell, D.T. 1960. "Blind variation and selective retentions in creative thought as in other knowledge processes," *Psychological review* (67:6), pp 380-400.
Chang, K.-C., Jackson, J., and Grover, V. 2003. "E-Commerce and Corporate Strategy: An Executive Perspective," *Information & Management* (40:7), pp 663–675.
Chatterjee, D., Grewal, R., and Sambamurthy, V. 2002. "Shaping up for E-Commerce: Institutional Enablers of the Organizational Assimilation of Web Technologies," *MIS Quarterly* (26:2), pp 65–89.
Chen, J.E., Pan, S.L., and Ouyang, T.H. 2014. "Routine Reconfiguration in Traditional Companies' E-Commerce Strategy Implementation: A Trajectory Perspective," *Information & Management*, Forthcoming.
Cohen, M.D., and Bacdayan, P. 1994. "Organizational Routines Are Stored as Procedural Memory: Evidence from a Laboratory Study," *Organization Science* (5:4), pp 554–568.
Cohen, M.D., Burkhart, R., Dosi, G., Egidi, M., Marengo, L., Warglien, M., and Winter, S. 1996. "Routines and Other Recurring Action Patterns of Organizations: Contemporary Research Issues," *Industrial and Corporate Change* (5:3), pp 653–698.
Colao, J.J. 2012. "Five Trends Driving Traditional Retail Towards Extinction." Retrieved 28 March, 2013, from http://www.forbes.com/sites/jjcolao/2012/12/13/five-trends-driving-traditional-retail-towards-extinction/.
Costello, N. 2000. *Stability and Change in High-Tech Enterprises — Organisational Practices and Routines*. London: Routledge.
Cyert, R.M., and March, J.G. 1963. *A Behavioral Theory of the Firm*. Upper Saddle River, NJ, US: Prentice Hall/Pearson Education.
D'Adderio, L., Feldman, M.S., Lazaric, N., and Pentland, B.T. 2012. "Call for Papers—Special Issue on Routine Dynamics: Exploring Sources of Stability and Change in Organizations," *Organization Science* (23:6), pp 1782–1783.
Døving, E., and Gooderham, P.N. 2008. "Dynamic Capabilities as Antecedents of the Scope of Related Diversification: The Case of Small Firm Accountancy Practices," *Strategic Management Journal* (29:8), pp 841–857.

Daft, R.L. 1982. "Bureaucratic Versus Nonbureaucratic Structure and the Process of Innovation and Change," *Research in the Sociology of Organizations* (1), pp 129–166.
Damanpour, F., and Evan, W.M. 1984. "Organizational Innovation and Performance: The Problem of "Organizational Lag"," *Administrative Science Quarterly* (29:3), pp 392–409.
Davenport, T., and Short, J. 1990. "The New Industrial Engineering: Information Technology and Business Process Redesign," *Sloan Management Review*, pp 11–27.
Davenport, T.H. 1998. "Putting the Enterprise into the Enterprise System," *Harvard Business Review* (76:4), pp 121–131.
Delacroix, J., and Swaminathan, A. 1991. "Cosmetic, Speculative, and Adaptive Organizational Change in the Wine Industry: A Longitudinal Study," *Administrative Science Quarterly* (36:4), pp 631–661.
Dutta, S., Zbaracki, M.J., and Bergen, M. 2003. "Pricing Process as a Capability: A Resource-Based Perspective," *Strategic Management Journal* (24:7), pp 615–630.
Dutton, J.E., and Dukerich, J.M. 1991. "Keeping an Eye on the Mirror: Image and Identity in Organizational Adaptation," *Academy of Management Journal* (34:3), pp 517–554.
Edmondson, A.C., Bohmer, R.M., and Pisano, G.P. 2001. "Disrupted Routines: Team Learning and New Technology Implementation in Hospitals," *Administrative Science Quarterly* (46:4), pp 685–716.
Eisenhardt, K.M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), pp 532–550.
Eisenhardt, K.M., and Graebner, M.E. 2007. "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* (50:1), pp 25–32.
El Sawy, O.A., Malhotra, A., Gosain, S., and Young, K.M. 1999. "It-Intensive Value Innovation in the Electronic Economy: Insights from Marshall Industries," *MIS Quarterly* (23:3), pp 305–335.
Feldman, M.S. 2000. "Organizational Routines as a Source of Continuous Change," *Organization Science* (11:6), pp 611–629.
Feldman, M.S. 2004. "Resources in Emerging Structures and Processes of Change," *Organization Science* (15:3), pp 295–309.
Feldman, M.S., and Pentland, B.T. 2003. "Reconceptualizing Organizational Routines as a Source of Flexibility and Change," *Administrative Science Quarterly* (48:1), pp 94–118.
Fox-Wolfgramm, S.J., Boal, K.B., and Hunt, J.G. 1998. "Organizational Adaptation to Institutional Change: A Comparative Study of First-Order Change in Prospector and Defender Banks," *Administrative Science Quarterly*, pp 87–126.

Gephart, R.P. 2004. "From the Editors: Qualitative Research and the Academy of Management Journal," *Academy of Management Journal* (47:4), pp 454–462.
Gersick, C.J.G., and Hackman, J.R. 1990. "Habitual Routines in Task-Performing Groups," *Organizational Behavior and Human Decision Processes* (47:1), pp 65–97.
Giddens, A. 1984. *The Constitution of Society: Outline of the Theory of Structuration*. John Wiley & Sons.
Gilbert, C. 2005. "Unbundling the Structure of Inertia: Resource Versus Routine Rigidity," *Academy of Management Journal* (48:5), pp 741–763.
Gittell, J.H. 2002. "Coordinating Mechanisms in Care Provider Groups: Relational Coordination as a Mediator and Input Uncertainty as a Moderator of Performance Effects," *Management Science* (48:11), pp 1408–1426.
Glaser, B.G., and Strauss, A.L. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine de Gruyter.
Goh, J.M., Gao, G., and Agarwal, R. 2011. "Evolving Work Routines: Adaptive Routinization of Information Technology in Healthcare," *Information Systems Research* (22:3), pp 565–585.
Gosain, S., Lee, Z., and Kim, Y. 2005. "The Management of Cross-Functional Inter-Dependencies in Erp Implementations: Emergent Coordination Patterns," *European Journal of Information Systems* (14:4), pp 371–387.
Grandon, E.E., and Pearson, J.M. 2004. "Electronic Commerce Adoption: An Empirical Study of Small and Medium Us Businesses," *Information & Management* (42:1), pp 197–216.
Hackbarth, G., and Kettinger, W.J. 2004. "Strategic Aspirations for Net-Enabled Business," *European Journal of Information Systems* (13:4), pp 273–285.
Hamel, G., and Prahalad, C. 1989. "Strategic Intent," *Harvard Business Review* (67:5), pp 63–76.
Hammer, M. 1990. "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review* (68:4), pp 104–112.
Hannan, M.T., and Freeman, J. 1984. "Structural Inertia and Organizational Change," *American Sociological Review* (49:2), pp 149–164.
Hargadon, A. 2003. *How Breakthroughs Happen: The Surprising Truth About How Corporations Innovate*. Boston: Harvard Business School Press.
Hoffman, D.L., and Novak, T.P. 2000. "How to Acquire Customers on the Web," *Harvard Business Review* (78:3), pp 179–188.
Howard-Grenville, J.A. 2005. "The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context," *Organization Science* (16:6), pp 618–636.

Hult, G.T.M., Ketchen, D.J., and Slater, S.F. 2004. "Information Processing, Knowledge Development, and Strategic Supply Chain Performance," *Academy of Management Journal* (47:2), pp 241–253.
Jasperson, J., Carter, P.E., and Zmud, R.W. 2005. "A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enabled Work Systems," *MIS Quarterly* (29:3), pp 525–557.
Johansson, H.J., McHugh, P., Pendlebury, A.J., and Wheeler, W.A. 1993. *Business Process Reengineering: Breakpoint Strategies for Market Dominance*. West Sussex, England: John Wiley & Sons.
Johnson, G. 1988. "Rethinking Incrementalism," *Strategic Management Journal* (9:1), pp 75–91.
Johnson, G., Scholes, K., and Whittington, R. 2008. *Exploring Corporate Strategy*. Person Education Ltd.
Kelly, D., and Amburgey, T.L. 1991. "Organizational Inertia and Momentum: A Dynamic Model of Strategic Change," *Academy of Management Journal* (34:3), September 1, pp 591–612.
Kenen, P.B. 1995. *Understanding Interdependence: The Macroeconomics of the Open Economy*. Princeton, New Jersey, USA: Princeton University Press.
Kirsch, L.J. 2004. "Deploying Common Systems Globally: The Dynamics of Control," *Information Systems Research* (15:4), pp 374–395.
Klein, H.K., and Myers, M.D. 1999. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly* (23:1), pp 67–93.
Kumar, K., and Van Dissel, H.G. 1996. "Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems," *MIS Quarterly*, pp 279–300.
Langley, A. 1999. "Strategies for Theorizing from Process Data," *Academy of Management Review* (24:4), pp 691–710.
Lavie, D. 2006. "Capability Reconfiguration: An Analysis of Incumbent Responses to Technological Change," *Academy of Management Review* (31:1), pp 153–174.
Lee, H.L., and Whang, S. 2001. "Winning the Last Mile of E-Commerce," *MIT Sloan Management Review* (42:4), pp 54–62.
Leonardi, P. 2011. "When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies," *MIS Quarterly* (35:1), pp 147–167.
Levina, N., and Vaast, E. 2006. "Turning a Community into a Market: A Practice Perspective on Information Technology in Boundary Spanning," *Journal of Management Information Systems* (22:4), pp 13–37.
Levitt, B., and March, J.G. 1988. "Organizational Learning," *Annual Review of Sociology* (14), pp 319–340.

Madill, A., Jordan, A., and Shirley, C. 2000. "Objectivity and Reliability in Qualitative Analysis: Realist, Contextualist and Radical Constructionist Epistemologies," *British Journal of Psychology* (91:1), pp 1–20.
March, J.G., and Simon, H.A. 1958 [1993]. *Organizations*. Oxford: Blackwell.
Marrone, J.A., Tesluk, P.E., and Carson, J.B. 2007. "A Multilevel Investigation of Antecedents and Consequences of Team Member Boundary-Spanning Behavior," *Academy of Management Journal* (50:6), pp 1423–1439.
Maxwell, J.A. 2012. *Qualitative Research Design: An Interactive Approach: An Interactive Approach*. Sage.
McAfee, A., and Brynjolfsson, E. 2008. "Investing in the It That Makes a Competitive Difference," *Harvard Business Review* (86:7/8), p 98.
McIver, D., Lengnick-Hall, C., Lengnick-Hall, M., and Ramachandran, I. 2013. "Understanding Work and Knowledge Management from a Knowledge-in-Practice Perspective," *Academy of Management Review*), p amr. 2011.0266.
Meeker, M. 2014. "Internet Trends 2014 - Code Conference."
Meyer, A.D. 1982. "Adapting to Environmental Jolts," *Administrative Science Quarterly*, pp 515–537.
Miles, M.B., and Huberman, A.M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook*. Sage.
Miller, D., and Friesen, P.H. 1980. "Momentum and Revolution in Organizational Adaptation," *Academy of Management Journal* (23:4), pp 591–614.
Monge, P.R., Cozzens, M.D., and Contractor, N.S. 1992. "Communication and Motivational Predictors of the Dynamics of Organizational Innovation," *Organization Science* (3:2), pp 250–274.
Mumford, M.D., and Gustafson, S.B. 1988. "Creativity syndrome: Integration, application, and innovation," *Psychological bulletin* (103:1), pp 27-43.
Nelson, R.R. 1995. "Recent Evolutionary Theorizing About Economic Change," *Journal of Economic Literature*, pp 48–90.
Nelson, R.R., and Winter, S.G. 1982. *An Evolutionary Theory of Economic Change*. Belknap press.
Newman, K.L. 2000. "Organizational Transformation During Institutional Upheaval," *Academy of Management Review* (25:3), pp 602–619.
Ngai, E.W., and Wat, F. 2002. "A Literature Review and Classification of Electronic Commerce Research," *Information & Management* (39:5), pp 415–429.
Nonaka, I. 1994. "A Dynamic Theory of Organizational Knowledge Creation," *Organization Science* (5:1), pp 14–37.
Nonaka, I., and Konno, N. 1998. ""the Concept of Ba": Building a Foundation for Knowledge Creation," *California Management Review* (40:3), p 43.

Nonaka, I., Von Krogh, G., and Voelpel, S. 2006. "Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances," *Organization studies* (27:8), pp 1179–1208.
Obstfeld, D. 2012. "Creative Projects: A Less Routine Approach toward Getting New Things Done," *Organization Science* (23:6), pp 1571–1592.
Orbuch, T.L. 1997. "People's Accounts Count: The Sociology of Accounts," *Annual Review of Sociology* (23), pp 455–478.
Orlikowski, W.J. 2000. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations," *Organization Science* (11:4), pp 404–428.
Orlikowski, W.J., and Baroudi, J.J. 1991. "Studying Information Technology in Organizations: Research Approaches and Assumptions," *Information Systems Research* (2:1), pp 1–28.
Pan, S., Pan, G., and Hsieh, M.H. 2006. "A Dual-Level Analysis of the Capability Development Process: A Case Study of Tt&T," *Journal of the American Society for Information Science and Technology* (57:13), pp 1814–1829.
Pan, S.L., Newell, S., Huang, J.C.M., and Galliers, R. 2007a. "Overcoming Knowledge Management Challenges During Erp Implementation: The Need to Share and Integrate Different Types of Knowledge?," *Journal of the American Society for Information Science and Technology* (58:3), pp 404–419.
Pan, S.L., Pan, G., Chen, A.J., and Hsieh, M.H. 2007b. "The Dynamics of Implementing and Managing Modularity of Organizational Routines During Capability Development: Insights from a Process Model," *IEEE Transactions on Engineering Management* (54:4), pp 800–813.
Pan, S.L., and Tan, B. 2011. "Demystifying Case Research: A Structured–Pragmatic–Situational (Sps) Approach to Conducting Case Studies," *Information and Organization* (21:3), pp 161–176.
Parmigiani, A., and Howard-Grenville, J. 2011. "Routines Revisited: Exploring the Capabilities and Practice Perspectives," *The Academy of Management Annals* (5:1), pp 413–453.
Pawlowski, A.D., and Robey, D. 2004. "Bridging User Organizations: Knowledge Brokering and the Work of Information Technology Professionals," *MIS Quarterly* (28), pp 645–672.
Pentland, B.T. 1999. "Building Process Theory with Narrative: From Description to Explanation," *Academy of Management Review* (24:4), pp 711–724.
Pentland, B.T., and Feldman, M.S. 2008. "Issues in Empirical Field Studies of Organizational Routines," in: *Handbook of Organizational Routines,* M.C. Becker (ed.). UK: Edward Elgar, pp 281–300.

Pentland, B.T., Hærem, T., and Hillison, D. 2010. "Comparing Organizational Routines as Recurrent Patterns of Action," *Organization Studies* (31:7), pp 917–940.
Pentland, B.T., Hærem, T., and Hillison, D. 2011. "The (N)Ever-Changing World: Stability and Change in Organizational Routines," *Organization Science* (22:6), pp 1369–1383.
Pentland, B.T., and Rueter, H.H. 1994. "Organizational Routines as Grammars of Action," *Administrative Science Quarterly* (39:3), pp 484–510.
Perrow, C. 1967. "A Framework for the Comparative Analysis of Organizations," *American Sociological Review*, pp 194–208.
Perry-Smith, J.E., and Shalley, C.E. 2003. "The Social Side of Creativity: A Static and Dynamic Social Network Perspective," *Academy of Management Review* (28:1), pp 89–106.
Pitt, M., and MacVaugh, J. 2008. "Knowledge Management for New Product Development," *Journal of Knowledge Management* (12:4), pp 101–116.
Porter, M.E. 2001. "Strategy and the Internet," *Harvard Business Review* (79:3), p 1.
Raman, R., and Bharadwaj, A. 2012. "Power Differentials and Performative Deviation Paths in Practice Transfer: The Case of Evidence-Based Medicine," *Organization Science* (23:6), pp 1593–1621.
Rigby, D.K., Reichheld, F.F., and Schefter, P. 2002. "Avoid the Four Perils of Crm," *Harvard Business Review* (80:2), pp 101–109.
Rockart, J.F., and Short, J.E. 1989. "It in the 1990s: Managing Organizational Interdependence," *Sloan Management Review* (30:2).
Ross, J.W., and Weill, P. 2002. "Six It Decisions Your It People Shouldn't Make," *Harvard Business Review* (80:11), pp 84–95.
Schultze, U., and Orlikowski, W.J. 2004. "A Practice Perspective on Technology-Mediated Network Relations: The Use of Internet-Based Self-Service Technologies," *Information Systems Research* (15:1), pp 87–106.
Scott, M.B., and Lyman, S.M. 1968. "Accounts," *American Sociological Review* (33:1), pp 46–62.
Siggelkow, N. 2007. "Persuasion with Case Studies," *Academy of Management Journal* (50:1), pp 20–24.
Simon, H.A. 1947/1997. *Administrative Behaviour*. New York: The Free Press.
Simonton, D.K. 1999. *Origins of genius: Darwinian perspectives on creativity*. Oxford University Press.
Sorenson, O., McEvily, S., Ren, C.R., and Roy, R. 2006. "Niche Width Revisited: Organizational Scope, Behavior and Performance," *Strategic Management Journal* (27:10), pp 915–936.
Starbuck, W.H. 1983. "Organizations as Action Generators," *American Sociological Review*, pp 91–102.
Staudenmayer, N., Tripsas, M., and Tucci, C.L. 2005. "Interfirm Modularity and Its Implications for Product Development," *Journal of Product Innovation Management* (22:4), pp 303–321.

Stene, E.O. 1940. "An Approach to a Science of Administration," *The American Political Science Review* (34:6), pp 1124–1137.
Stoeberl, P.A., Parker, G.E., and Joo, S.J. 1998. "Relationship between Organizational Change and Failure in the Wine Industry: An Event History Analysis," *Journal of Management Studies* (35:4), pp 537–555.
Strauss, A., and Corbin, J. 1998. "Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory".
Strauss, A., Fagerhaugh, S., Suczek, B., and Wiener, C. 1985. *Social Organization of Medical Work*. Chicago: University of Chicago Press.
Strauss, A.L. 1993. *Continual Permutations of Action*. New York: Aldine de Gruyter.
Taylor, F.W. 1914. *The Principles of Scientific Management*. Harper.
Teece, D., and Pisano, G. 1994. "The Dynamic Capabilities of Firms: An Introduction," *Industrial and Corporate Change* (3:3), pp 537–556.
Teece, D.J., Pisano, G., and Shuen, A. 1997. "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* (18:7), pp 509–533.
Thompson, J.D. 1962. *Organizations in Action: Social Science Bases of Administrative Theory*. New York, NY, US: McGraw-Hill.
Thompson, J.D. 1967. *Organizations in Action*. New York: Mc-Graw-Hill.
Turner, S.F., and Rindova, V. 2012. "A Balancing Act: How Organizations Pursue Consistency in Routine Functioning in the Face of Ongoing Change," *Organization Science* (23:1), pp 24–46.
Tushman, M.L. 1977. "Specialty Boundary Roles in the Innovation Process," *Administrative Science Quarterly* (22:4), pp 587–605.
Tushman, M.L., and Romanelli, E. 1985. "Organizational Evolution: A Metamorphosis Model of Convergence and Reorientation," *Research in Organizational Behavior* (7), pp 171–222.
Urban, G.L., Sultan, F., and Qualls, W.J. 2000. "Placing Trust at the Center of Your Internet Strategy," *Sloan Management Review* (42:1), pp 39–48.
Venkatesan, R., and Kumar, V. 2004. "A Customer Lifetime Value Framework for Customer Selection and Resource Allocation Strategy," *Journal of Marketing* (68:4), pp 106–125.
Venkatraman, N. 1994. "It-Enabled Business Transformation: From Automation to Business Scope Redefinition," *Sloan Management Review* (35), pp 73–87.
Victor, B., Boynton, A., and Stephens-Jahng, T. 2000. "The Effective Design of Work under Total Quality Management," *Organization Science* (11:1), pp 102–117.
Walsham, G. 1995. "The Emergence of Interpretivism in Is Research," *Information Systems Research* (6:4), pp 376–394.
Walsham, G. 2006. "Doing Interpretive Research," *European Journal of Information Systems* (15:3), pp 320–330.

Wauters, R. 2009. "When It Comes to E-Commerce, There Is No Europe." Retrieved 30 March 2013, 2013, from http://techcrunch.com/2009/10/23/when-it-comes-to-e-commerce-there-is-no-europe/.
Weiss, H.M., and Ilgen, D.R. 1985. "Routinized Behavior in Organizations," *Journal of Behavioral Economics* (14:1), pp 57–67.
Wiesenfeld, B.M., and Hewlin, P.F. 2003. "Splintered Identity and Organizational Change: The Predicament of Boundary Spanning Managers," *Research on Managing Groups and Teams* (5), pp 27–52.
Wiig, K.M., and Jooste, A. 2003. "Exploiting Knowledge for Productivity Gains," in: *Handbook on Knowledge Management*. Springer, pp 289–308.
Winter, S.G. 1964. "Economic" Natural Selection" and the Theory of the Firm," in: *Yale Economic Essays*. Yale University.
Woodman, R.W., Sawyer, J.E., and Griffin, R.W. 1993. "Toward a Theory of Organizational Creativity," *Academy of Management Review* (18), pp 293–321.
Yin, R.K. 2013. *Case Study Research: Design and Methods*. Sage publications.
Zaltman, G., Duncan, R., and Holbek, J. 1973. *Innovations and Organizations*. Wiley New York.
Zbaracki, M.J., and Bergen, M. 2010. "When Truces Collapse: A Longitudinal Study of Price-Adjustment Routines," *Organization Science* (21:5), pp 955–972.
Zhu, K., and Kraemer, K.L. 2002. "E-Commerce Metrics for Net-Enhanced Organizations: Assessing the Value of E-Commerce to Firm Performance in the Manufacturing Sector," *Information Systems Research* (13:3), pp 275–295.
Zollo, M., and Winter, S.G. 2002. "Deliberate Learning and the Evolution of Dynamic Capabilities," *Organization Science* (13:3), pp 339–351.
Zott, C. 2002. "Dynamic Capabilities and the Emergence of Intraindustry Differential Firm Performance: Insights from a Simulation Study," *Strategic Management Journal* (24), pp 97–125.

Appendix A: Representative Quotations of Study I

Representative Quotations of the Relation between the Trajectory Scheme and the Trajectory Action

Theoretical Constructs	***Empirical Observation***
Trajectory scheme ***reforms*** trajectory action	"*The visual monitoring reports, as well as the visual tracking information that can be accessed at the client's end…* ***we didn't have all of those before.*** *With the help of these changes* (*in 2011, we couldn't manage 1,400 orders at the same time,*) *but now* [*in a recent sale in 2012*]*, we can easily manage the 50,000 orders placed in just one day. Now we can easily get [the order processing status] from the reports generated in our system*." (*Informant #1, Manager of Logistics Department, Step 1: Acquiring Management Capabilities for the Order Distribution Routine*) "*The changes to the schedule of 83 TCs involved the schedule of our shuttle vehicles, the time limitation of the transportation* [*from the TCs*] *to the service point, the time limitation of the transportation from the service point to the customer, the method for the making of appointments , the SMS tracking system, and so on.* ***The scheduling of over 3,000 internal and external vehicles and the warehouse operation systems in the 83 TCs were all changed dramatically in terms of their operational approaches****, according to the expectations of customer-oriented order distribution. For instance, the frequency of vehicles entering and exiting warehouses and the strategy of stock planning for entering and exiting warehouses* [*were changed*]." (*Informant #1, Manager of Logistics Department, Step 3: Developing the Capability for Speedy Delivery*)

Representative Quotations of the Relation between the Trajectory Scheme and the Trajectory Action (Contd.)

Theoretical Constructs	***Empirical Observation***
Trajectory action ***challenges*** trajectory scheme	"*There was an occasion when a customer ordered a product at midnight, and we delivered it at midnight — our logistics staff knocked on the door of the customer's home at 3 AM! The customer was of course troubled.*" (*Informant #2, Director of IT Department, Step 3: Developing the Capability for Speedy Delivery*) "*We* ***purchased a four-dimensional map [system]….*** *As long as a customer provides a description of the address,* ***our system can*** *…* ***easily calculate which service point is the best*** *from which to serve an order.* ***The system will automatically tag this information to the order without any manual intervention.*** *Now that we have around 40 million orders coming from various channels, the working load would be overwhelming if we assigned* (*orders to service points*) *manually*. (*Informant #3, Manager of IT Department, Step I: Enhancing the Management Capabilities of the Service Routine*)

Representative Quotations of the Relation between the Trajectory Projection and the Trajectory Scheme

Theoretical Constructs	***Empirical Observation***
Trajectory projection ***steers*** trajectory scheme	"*In the past,* ***we thought it was unnecessary to deliver the product and invoice together, but our customers weren't satisfied. (So, we decided to integrate them.) Now we expect the invoice to be ready during the dispatching of an order.*** *But then, there weren't any printers in our warehouses, so we purchased printers and computers for our 83 TCs, so that they could print invoices on-site*." (*Informant #5, Director of IT Department, Step 4: Integrating Order-Processing Operations among Business Functions*)
Trajectory scheme ***elevates*** trajectory projection	"*E-commerce customers want speedy and high-quality services. In order to satisfy our customers, our Service Department provides* '**installation on delivery**'*, which means that we promise to install the machine immediately when it is delivered, so that our customers can enjoy the product without further delay. In addition, we provide* '**invoice on delivery**'*. In doing so, we can provide our customers with a better experience. Also, we are now testing and promoting* '***cash on delivery***'*. We are also working on a new service to* **collect filled documents from our customers at the same time as delivery***, for them to conveniently redeem special governmental allowances*." (*Informant #4, Director of Service Department, Step II: Emergence of "one-stop service*")

Representative Quotations of the Relation between the Trajectory Projection and the Trajectory Action

Theoretical Constructs	***Empirical Observation***
Trajectory projection ***stimulates*** trajectory action	"*During the past mother's day… some customers requested: 'Can you send a thank you letter or a bunch of flowers together with the products to my parents?'* **We had never done that before,** *so* **the sales staff asked the Logistics and Service Departments whether we could fulfill this request**. **We agreed to do so and started to provide what the customers wanted….** *As a result, our customer was very happy, and so were his parents.* **In doing so, we provided the best user experience.** *In traditional retail… you cannot deliver the products with a letter and flowers.*" (*Informant #4, Director of Service Department, Step III: Emergence of "customized service*") "**Our aim is to satisfy customers' needs and provide the best experience for our customers**…. *Traditionally, major logistic companies don't deliver to rural areas.* [*Other home appliance retailers*] *usually charge extra fees for rural area delivery but only deliver to a transportation hub near the customers' village; the customers have to collect the product themselves and transport the products back home. But* **our company provides free delivery of products to all consumers' homes**. *Hence, many consumers living in the rural areas are very happy: because of the poor road conditions in the rural areas, our vehicle has to stop at the entrance of the village.* **Our staff carried the products on their backs for several miles** *so that they could deliver the products to the customer's home.*" (*Informant #4, Director of Service Department, Step III: Emergence of "customized service*")
Trajectory action ***renovates*** trajectory projection	"*In the past, the delivery speed of Haier's e-commerce was not very satisfactory.* **But we found many customers**, *especially the Chinese customers, were* **really concerned about the delivery speed. So we introduced '24-hour shipping'**." (*Informant #2, Director of IT Department, Step 2: Refining Expectations for the Order Distribution Routine*) "*At first, we provided door-to-door free delivery…. Then we provided a distinctive service called 'installation on delivery'…. We have been paying close attention to consumers' needs; as* **our consumers' needs evolve**, *so do our services keep improving, and* **our promises to our customers also keep increasing**." (*Informant #1, Manager of Logistics Department, Step 2: Refining Expectations for the Order Distribution Routine*)

Appendix B: Representative Quotations of Study II

Representative Quotations of the Strategic Level Approach of Cross-Fertilization

Theoretical Constructs		***Empirical Observation***
ES as Space	Educational Space	"[*To learn the whole set of practices of a new department*], *we follow the staff [of the target department for over one month] to understand all the practices* [*offline and online in the ERP system.*]" (*Informant #10, Staff of IT Department*)
Cross-Fertilization Configuration	Point-to-Point Network	"*I am Shao, currently an Assistant of the General Manager in the Procurement Department.* ***I was rotated into Procurement Department*** *this year, and I've been staying here for about 9 months.* ***Before the rotation I had been in the Finance Department.***" (*Informant #3, Assistant of the General Manager in the Procurement Department*) "*There was a manager of the IT Department called Pizhen Chen, he* ***was rotated from the IT Department into the Production Department****. I also know an ex-manager of the Production Department called Shumin Feng. At the beginning he had been* ***working in the Production Department****.* ***Then he was rotated into the Marketing Department****, in charge of logistics supports.*" (*Informant #7, Associate Manager of Finance Department*)

Representative Quotations of the Strategic Level Approach of Cross-Fertilization (Contd.)

Theoretical Constructs		*Empirical Observation*
Role of Pollinators	Selected Managers as Knowledge Combinators	"***From [traditional procurement staff's] perspective****, the existing procurement staff depend on the market price to complete an order of procurement. In particular, how much does it cost to buy this product in the market? How much do others pay for the same product? … They make decisions according to these benchmarks... So the procurement staff simply gave me a list of quotes, such as 'Supplier A sells the product for RMB 3000 per unit, Supplier B sells the product for RMB 2000 per unit'. However, I think such a form of price enquiry is not informative at all…* [*Even if the chosen supplier offers the cheapest price,*] *you don't know whether that is really the best one*." (*Informant #3, Assistant of the General Manager in the Procurement Department*) "*...to evaluate the financial value of certain materials,* ***I as a financial expert*** *need to know how much resources it takes to produce a product, how much would these resources cost, and what the profit rates of the suppliers are…*" (*Informant #3, Assistant of the General Manager in the Procurement Department*) "*Pizhen Chi was a very senior IT manager in our company specialized regarding our ERP system. He was rotated into the Operation Center of Production Department. Although he left the IT Department,* ***he works in the Production Department with his knowledge on IT****… He* ***helps to better connect the work of the IT Department and the Production Department.***" (*Informant #7, Associate Manager of Finance Department*)

Representative Quotations of the Strategic Level Approach of Cross-Fertilization (Contd.)

Theoretical Constructs		***Empirical Observation***
Implication of Cross-Fertilization	Synergy of trajectory projections across interconnected routines	"*By* ***evaluating the financial value of suppliers' products (instead of the book value)****, we can find a supplier providing the best quality at the lowest cost. Then we can have a long-term collaboration with this supplier.*" (*Informant #3, Assistant of the General Manager in the Procurement Department*) "*Although* [*Pizhen Chi*] *left the IT Department, he works in the Production Department with his knowledge on IT.* ***So he spent efforts on the work regarding data generation, data mining, etc.*** *in the Production Department.*" (*Informant #7, Associate Manager of the Finance Department*)

Representative Quotations of the Tactical Level Approach of Cross-Fertilization

Theoretical Constructs		***Evidence From The Case***
ES as Space	Communication Space	"[*In order to pick up the skills and knowledge of a new department*], *first we let the staff [from target department] to introduce their practices. Second, we proactively learnt how they carry out their business* [*via their ERP modules*] *by in-depth discussion with them on it.*" (*Informant #10, Staff of IT Department*)
Cross-Fertilization Configuration	Mesh Network	"***I worked very closely with the staff in the Finance Department****. When our ERP system was implemented in 2008, I had been staying in the Finance Department all day for about one year. I sat in the office of Finance Department every day, together with financial staff.*" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*) "***We (the IT staff) sat with the financial staff in the same office every day****, and communicated with and supported them whenever necessary, in order to improve the systems.*" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*) "*Our IT Department has organized small groups of staff specialized on working with different departments in the company, respectively.*" (*Informant #6, Manager of the IT Department*)

Representative Quotations of the Tactical Level Approach of Cross-Fertilization (Contd.)

Theoretical Constructs		***Evidence From The Case***
Role of Pollinators	Involved Staff As Knowledge Ambassadors	"*As an IT expert working in finance-related work, I have very different perspectives from the staff simply working in the Finance Department. The financial staff often only care about financial statements, but* ***as an IT staff, I think I can provide them some refreshing ideas despite my limited financial knowledge****. Say in a particular action you don't need to follow a purely method from accounting area, I can help you to achieve the same result utilizing computer.*" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*) "*When I just entered the company in 2008 as an IT staff…I was in charge of the maintenance of the finance-related modules in our ERP system. We* (*the IT team*) *hadn't learnt finance or accounting before, but we have to manage a finance system, so we had to learn from financial staff, and* ***we need to [know how the financial staff complete their work in detail to maintain the systems***]… ***At that time I always prepared a question list for the financial staff, in order to complete my work…*** *During this process I learnt a lot business knowledge in the finance area… I literally communicated with all the staff in the Finance Department.*" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*)

Representative Quotations of the Tactical Level Approach of Cross-Fertilization (Contd.)

Theoretical Constructs		***Evidence From The Case***
Implication of Cross-Fertilization	Conjunction of trajectory schemes across interconnected routines	"*In the past I only noticed users' needs very fragmentally, and I knew that I needed to develop a system* [*incorporating various needs raised by users without further improvement*]. *But now,* ***we can be very clear about what kind of financial tasks this system is aiming to solve, what the particular needs are, how to plan the financial IT system for the whole company, and how to design the system in order to satisfy these needs.***" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*) "*With my financial knowledge, I can proactively provide our financial staff better* [*IT*] *working solutions. Take the bank accepted bill for example. In the part the subsidiary companies manage their own bank accepted bill. For instance, Yantai subsidiary has its own account to manage its bank accepted bill, so is Ningbo subsidiary. As a result if the Yantai subsidiary passes a bank accepted bill to Ningbo side, the staff of Ningbo subsidiary has to enter the information of the bank accepted bill into its system again. I know that we cannot centrally manage the all the bank accepted bills of our Wanhua Group at ERP system level,* ***so we created a small tool in the system to avoid the repetitive manual inputting the same bank accepted bills, saving a lot of working load.***" (*Informant #1, Ex-Staff of the IT Department, Current Staff of the Finance Department*) "***With sufficient knowledge on IT [accumulated these years], we launched 'lean production'****…* (*By analyzing our production data carefully and taking actions accordingly,*) *we could save a significant amount of cost. Take water for instance, in the past we simply discharged our cooling water generated during production. Now I recycle it into big bottles* [*and reuse it again.*]" (*Informant #8, Staff of the Production Department*)

Representative Quotations of the Operational Level Approach of Cross-Fertilization

Theoretical Constructs		***Evidence From The Case***
ES as Space	Regulating Space	[*After using ERP,*] *the financial reconciliation job shall be completed in the ERP system.* [*Financial reconciliation means that*], *we have to confirm the payment via different payment method has already arrived before order dispatch… In the past we just do it manually* [*without tight constraints*], *but now,* ***we could not dispatch the products if [related procedures haven't been went through in ERP systems]*** (*Informant #4, Staff of the Marketing Department*)
Cross-Fertilization Configuration	Radial Network	"***The MPAcc program was designed for staff without accounting background to understand basic financial and accounting knowledge***." (*Informant #2, Vice President of Wanhua*) "*We have various knowledge sharing activities… for instance, we have Study Group on different topics. We* (*Finance Department*) *have a SAP Simulation Group* ***for all stuffs to learn and experience the system operations commonly conducted by other business functions***." (*Informant #7, Associate Manager of the Finance Department*) "*At the first time we sent our staff to undertake SAP certificated training, we sent 13 staff. Among them,* ***only about half of them are from the IT Department, others came from other business functions.*** *For instance, we Finance Department sent 3 staff.*" (*Informant #7, Associate Manager of the Finance Department*) "*Now we had 30 staff with the SAP certification.* ***Many of them are from our business functions other than the IT Department.***" (*Informant #2, Vice President of Wanhua*)

Representative Quotations of the Operational Level Approach of Cross-Fertilization (Contd.)

Theoretical Constructs		***Evidence From The Case***
Role of Pollinators	Selected Trainers As Knowledge Distributors	"*We realized that to better operate SAP systems, all our staff need some financial knowledge… So we invited* [*a university*] *to provide part-time Master degree program in Accounting* (*MPAcc*) *for our staff.*" (*Informant #2, Vice President of Wanhua*) "*I was a teacher of a Study Group prepared for the Procurement Department.*" (*Informant #7, Associate Manager of the Finance Department*) "*By sending staff from various departments to get SAP certification, I want to turn the inertia of our organizational transformation into the motor of transformation… These SAP trainees are expert of different departments, I let them learn then be responsible for the adoption of ERP in their departments respectively.*" (*Informant #2, Vice President of Wanhua*) "*We* (*the financial staff*) *together with the IT Department worked closely with each business functions we need to support. For any department we are responsible for, we will teach staff in that department how to use the new system.*" (*Informant #9, Staff of the Finance Department*)
Implication of Cross-Fertilization	Conformity of trajectory actions across interconnected routines	"*After acquiring accounting knowledge, you know this* (*bringing the Letter of Credit to Finance Department for approval*) *is designed for risk control. We can better understand why our financial staff ask for such actions* (*and adhere accordingly*)." (*Informant #4, Staff of the Marketing Department*) "*By training and timely communication, we do our best to ensure our end users adapted our systems.*" (*Informant #9, Staff of the Finance Department*)

Appendix C: List of Interviewees, Positions and Ranks in Study I

Position	*Rank*
✓ Vice President A of the Haier Group	Top Manager (TM)
✓ Vice President B of the Haier Group	TM
✓ Senior Director A, in charge of research and innovation	TM
✓ Senior Director B, in charge of general corporate strategy	TM
✓ Senior Director C, in charge of e-commerce strategy	TM
✓ Manager A, in charge of e-Haier.com	Middle Manager (MM)
✓ Manager B, in charge of online-offline integration	MM
✓ Manager C, in charge of institutional innovation	MM
✓ Manager D, in charge of corporate informatization	MM
✓ Manager E, in charge of corporate informatization	MM
✓ Manager F, in charge of white appliance production	MM
✓ Manager G, in charge of white appliance production system	MM
✓ Manager H, in charge of white appliance supply chain	MM
✓ Manager I, in charge of white appliance R&D	MM
✓ Manager J, in charge of web-based operation innovation	MM
✓ Staff A, in charge of internal online platform	Junior Staff (JS)
✓ Staff B, in charge of logistic-related IT practices	JS
✓ Staff C, in charge of service-related IT practices	JS

Position	*Rank*
✓ Staff D, engineer on business analytics	JS
✓ Staff E, in charge of e-commerce-related service	JS
✓ Staff F, in charge of e-commerce-related logistics	JS
✓ Staff G, in charge of e-commerce related logistics	JS
✓ Staff H, in charge of IT development	JS
✓ Staff I, in charge of IT development	JS
✓ Staff J, in charge of IT development	JS

Appendix D: List of Interviewees, Positions and Ranks in Study II

Position	*Rank*
✓ Board Member, Deputy Vice President, CIO, CFO, Board secretary of Wanhua Group	Top Manager (TM)
✓ Senior Director, in charge of Department of Business Process and Informatization	TM
✓ Assistant of the General Manager in the Procurement Department	Middle Management (MM)
✓ Associate Manager of Finance Department	MM
✓ Staff of the Finance Department	MM
✓ Staff of the Marketing Department, in charge of product exportation	Junior Staff (JS)
✓ Staff of the Production Department	JS
✓ Staff A from IT Department, in charge of finance-related IT usage	JS
✓ Staff B from IT Department, in charge of procurement-related IT usage	JS
✓ Staff C from IT Department, in charge of HR-related IT usage	JS
✓ Staff D from IT Department, in charge of procurement-related IT usage	JS
✓ Staff E of the Finance Department	JS
✓ Staff F of the Finance Department	JS
✓ Staff of the International Business Department	JS